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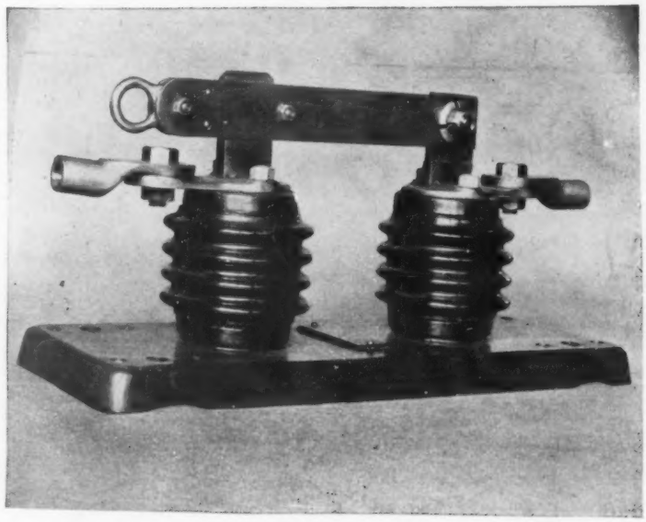

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Electrical West

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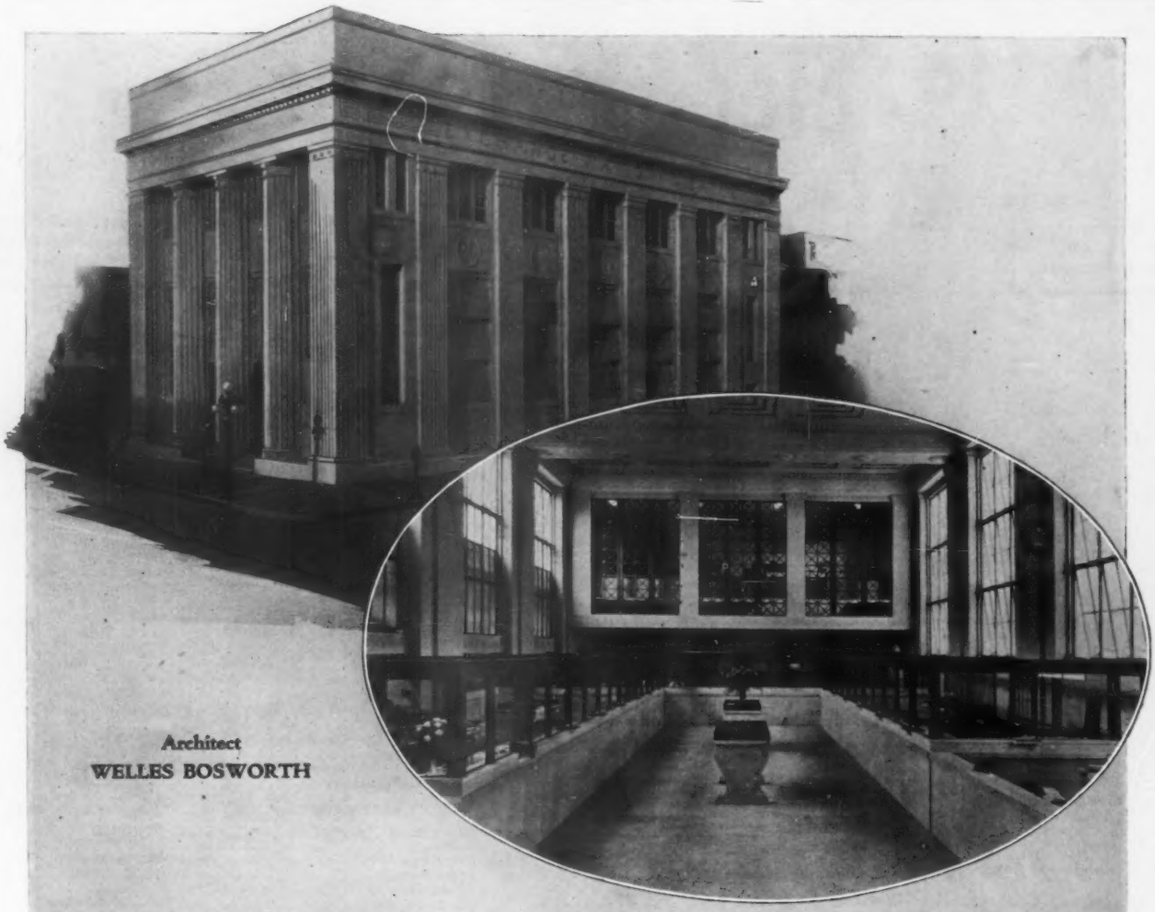

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C. T. HUTCHINSON
Editorial Director

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G. C. TENNEY
Managing Editor

Volume 59 | San Francisco, December 1, 1927 | Number 6

Good Work Possible Under Motor Section Organization

WHEN is a manufacturer a machinery manufacturer? When is an industrial not the right kind of an industrial? Far from silly questions these when policy with respect to motor sales is under consideration. They are questions which determine to whom should be given the privilege of selling a motor. Therefore they are problems upon which the viewpoint of both manufacturer and contractor are necessary.

A healthy step in the direction of solution of these and even more intricate trade relationship problems is the formation of the motor section of the California Electragists. That the need for such a center of discussion is universal becomes evident from the fact that following immediately upon the California section formation there sprang into existence all over the United States similar groups and that a place on the program was set aside at the convention of the Association of Electragists, International, at St. Louis last month for the purposes of that section alone. Representatives from the motor manufacturers met there with representatives of motor dealers for a frank discussion of trade policy.

Selling policies are determined at headquarters. Installation and engineering problems are determined locally. By means of this newly formed motor section, in both its national and its local groups, the solution of both policy and problem may be sought more intelligently and no doubt more successfully.

Consistency—the Well Known Jewel

MUCH depends upon whose foot the shoe is pinching. This bit of homely philiosophy has been brought to mind by the fact that the Merchants Association of the City of Pasadena has seen fit to protest —unsuccessfully as it happens—to the city council because the Municipal Light & Power Department is selling light bulbs at cost. In so doing, the lighting department is, in the opinion of the association, doing a grave injustice to the local merchants.

Among other things, the complaint states "that it is the belief of the directors of the Pasadena Merchants Association that the re-sale of purchased merchandise is not a proper governmental function of the city nor a proper function of the municipal light department. It is thought that the municipal light department should confine its activities and devote its best efforts to the manufacture, purchase, sale and distribution of electrical energy to the end that the citizens of Pasadena may be served at the lowest possible rates consistent with good business management."

It might appear to the thinking individual that the process of determining just what constitutes a "proper" governmental function has become an exceedingly fine, fine art. Just why a municipality is justified in engaging in the light and power business but is not justified in selling lamps to use this same electricity, involves a distinction unappreciated by the merchants until their field was trespassed. As previously remarked, much depends upon whose foot the shoe is pinching.

Governmental System Ill Adapted to Business

AT A RECENT meeting of the Finance Committee of the City Council of Seattle were heard arguments as to whether or not the City Light Department should continue to engage in the business of selling electrical merchandise. It may be remembered that the issue has been fought long and heatedly in that city and that finally an attempt had been made to induce the council to settle the question by ordinance; and this was the second hearing on the matter and the first on an ordinance proposing to limit somewhat the city's merchandising activities. To gain first-hand knowledge of how this hotly contested fight was being conducted, a representative of ELECTRICAL WEST, then in Seattle, attended. Without presuming to take sides in the matter or to advise Seattle in her apparent dilemma, ELECTRICAL WEST believes its readers will be interested in its interpretation of the meeting, which furnished such an excellent example of the power of politics to intrude in municipal business enterprises where economic principles alone should be the determining factors.

It appeared that the electrical dealers were represented by a few of their number, with an attorney to place their case concisely before the committee. They asked that the City Light Department discontinue merchandising, or modify its merchandising policy materially, and their arguments were based on economic facts and business considerations. On the other side, it is understood, the City Light Department had been heard before, and had put its case into the hands of the committee in writing, so that it was necessary to have the department officially represented at the meeting only to answer questions. But what of the "dear people"? Never fear but that the interests of the people were amply protected by half a dozen self-appointed guardians of the public welfare, who took up over three-quarters of the hour and a half given over to a consideration of the question with the choicest assortment of irrelevant, fallacious and specious verbosity that has come to the attention of ELECTRICAL WEST in some time.

One elderly woman, who earlier the same afternoon

had advised the council in another matter about which she apparently knew as little as she did about the merchandising question, spent twenty minutes recounting how she had bought a washing machine from the city and liked it so well she had assisted in selling others in her neighborhood, for which she had received some sort of premium from the city's merchandising department. One man, who likewise had orated on the previous matter, admitted that he represented the 100,000 families in Seattle, who to a man, woman and child, were against any change in a policy that, he said, made it possible for these good citizens to secure electrical appliances cheaper than they otherwise could—being a little hazy on the point as to why he discriminated in favor of the butcher and the baker against the modern candlestick maker. Another warned the council against interference with the City Light policies, pointing out that the individual action of each councilman in the matter would be reflected in that councilman's success or unsuccess at the next election, since the City Light Department served and counted as friends a majority of the voting public. Another, representing labor in some capacity, officially or otherwise, was in favor of the department's doing as it chose because the City Light paid higher wages than the private company.

This represents a fair cross-section of the arguments advanced by the champions of the people, among whom will be recognized axe-grinders, professional lobbyists, self-appointed watchful guardians, and plain common-or-garden busybodies—types that beset city councils the country over, spreading on the minutes their inept opinions on all manner of technical subjects which city councils perforce must consider.

The incident illustrates nothing so well as that our machinery of government is ill adapted to administer a business enterprise, which obviously thrives better on prompt executive action based on sound economic thinking than on necessarily slow legislative action based on political considerations. We cannot expect a legislative body to meet the changing exigencies of modern business promptly and economically as long as it must permit every Tom, Dick, Harry and Jane with a flair for public speaking to be heard on complex matters of economic policy. We cannot expect the personnel of our governmental bodies to be insensible of the political aspects of each situation that arises. We can expect, however, that through the continued sane voting by the body politic we shall be able to confine the scope of government in general to the ponderous job of governing, leaving the realm of business open to the private initiative of the governed, in the hope that the rewards earned through private initiative will continue to be sufficient to provide not only for our governmental machinery, but also for the many material and spiritual advantages that have been available to all in this country in recent years.

Wherein the N.E.L.A. May Learn from its Divisions

IF IT is truly the aim of an association to profit by the interchange of ideas and knowledge, the National Electric Light Association may find much that is worth emulation in the organization practice of some of its divisions. A case in point is that of getting a committee organization under full head and under way immediately at the beginning of the association year.

It is no uncommon thing, in fact until recently it was accepted as inevitable, to find half of a year spent in the mere preliminaries of organization before any actual work itself was undertaken by a national committee. To some extent this is still true of division committees, but of recent years division executives have felt that this situation is wasteful of time and of effort and that the usefulness of a committee begins only at the time when it is about to be disbanded to make way for another administration.

To obviate this common failing a new form of organization is fast taking shape. The Engineering Section pioneered it, and others are following suit to their advantage. It consists of appointing to a vice-chairmanship the next year's chairman. This demands closer co-operation between one administration and the next. And this is a desirable condition under all circumstances. It should not run into difficulties under the present method whereby the chief executive of the association is nearly always given a two-year preliminary office as vice-president.

Greater continuity of effort results from such a plan. Each year's work ties in closely with that of the previous year and prepares the way for the succeeding years. There is less back-tracking over already plowed ground. Instead of taking the report of a past year and paraphrasing it for this year's new report, changing only the adjectives and adverbs, a committee can begin work based upon the previous findings and set about to accomplish results. After all is said reports can go on forever but it is on results that an association is ajudged worthy of its salt.

On a national scale the task of organization of committees a year ahead may assume herculean proportions. Yet is it not this sort of leadership that we look for in our national executives?

Rocky Mountain Region Holds No Patent on Christmas Illumination

SNOW and pine trees *do* contribute to the spirit of Christmas, there is no doubt about it, but Christmas occurs just the same without them, even in the land of oranges and cotton. And certainly, lacking snow and pines, the efforts should be proportionately greater to decorate and brighten a community than where these natural attributes of the holiday season already abound.

To look over the scene, however, year after year, would be to draw the conclusion that in nowhere but Colorado or Utah is there much attempt upon the part of an entire community to decorate and light up for Christmas. Year after year these mountain regions have been blazoned to the world as the "Christmas Cities of the World," and pictures of decorated homes and stores have gone abroad to tell that world how they have done it. Again this year they have laid plans which will find culmination in whole cities ablaze with color and light, homes decorated with wreaths and streamers of evergreen besprinkled with glowworm lights of all hues. The stranger in their midst will know he is in a Christmas land.

In other cities of the West in sporadic instances, a gas station here, a department store there, a community shopping district somewhere else, and a few isolated homes perhaps will know that Christmas holidays are at hand and find themselves bedecked for the happy occasion. But why may there not be more "Christmas Cities"? Orange trees, redwoods, and Douglas fir all look well decorated with lights. House shrubs, grape vines, fig trees and even palms are not averse

to decorative effects. A wreath in the window above an electrically lighted Christmas candle, office and store buildings in holiday dress, these are all possible in Washington, Oregon, California or Arizona.

And from the cold-blooded business standpoint, if a hundred thousand listeners on the radio to a world's championship prizefight actually can be measured in largely increased kilowatt-hour sales, as a recent test showed, certainly there is a reason to stimulate the making of every city in the West a "Christmas City."

Praise be to Colorado and Utah for their yearly successful displays, but may we not see more cities in the West likewise garbed in light for the holidays?

Colorado River Development and the Swing-Johnson Bill

JUST what action Congress will take on Colorado River development when it convenes this month is problematical, but political prophets are certain that the Swing-Johnson Bill will receive consideration. Backed by the administration and possessed of the strong support of Secretary of Commerce Hoover and Secretary of the Interior Work, the bill stands more than a fair chance of passing. However, there is every indication that its course will be a stormy one.

Included among the staunch supporters of the measure as it is now written are the California and Nevada delegations and the proponents of government participation in the light and power business. On the other side are the Arizona delegation, the representatives of the upper basin states, and those who feel that the generation and sale of power is not a governmental function. Arizona's objections to the bill are too well known to be repeated. The upper basin states object to the passage of any Colorado River legislation until six of the seven states reach an agreement among themselves regarding the division of the waters of the river. Recent meetings of representatives of the seven states involved indicate that there is little hope for an immediate compact agreeable to all seven commonwealths. California has shown a willingness to participate in a six-state compact provided the Swing-Johnson Bill passes.

To date argument over the bill has centered around the power question. Flood control, stream regulation, water storage and silt deposition, the immediate necessities, have been lost sight of in the rosy clouds of fancy that envelop the political dreams of the countless millions of kilowatt-hours that will be available from damming the river. That these kilowatt-hours may be a drug on the market seems never to have entered the heads of the politicians, yet in the light of recent developments it is questionable if purchasers can be found for power from the Colorado River.

The effectiveness of the Swing-Johnson Bill is founded upon the supposition that revenues from the sale of power to be generated at a plant located at either Boulder or Black Canyon will be sufficient to repay all costs over a term of fifty years. Section 4b of the bill contains the following statement:

"Before any money is appropriated or any construction work done or contracted for, the Secretary of the Interior shall make provision for revenues, by contract or otherwise, in accordance with the provisions of this act, adequate in his mind to insure payment of all expenses of operation and maintenance of said works incurred by the United States and the repayment, within fifty years from the date of completion of the project, of all amounts advanced . . . together with interest thereon."

It would appear that if customers for the power are not forthcoming, then no dam can be built nor any development undertaken under the terms of the bill as it is written.

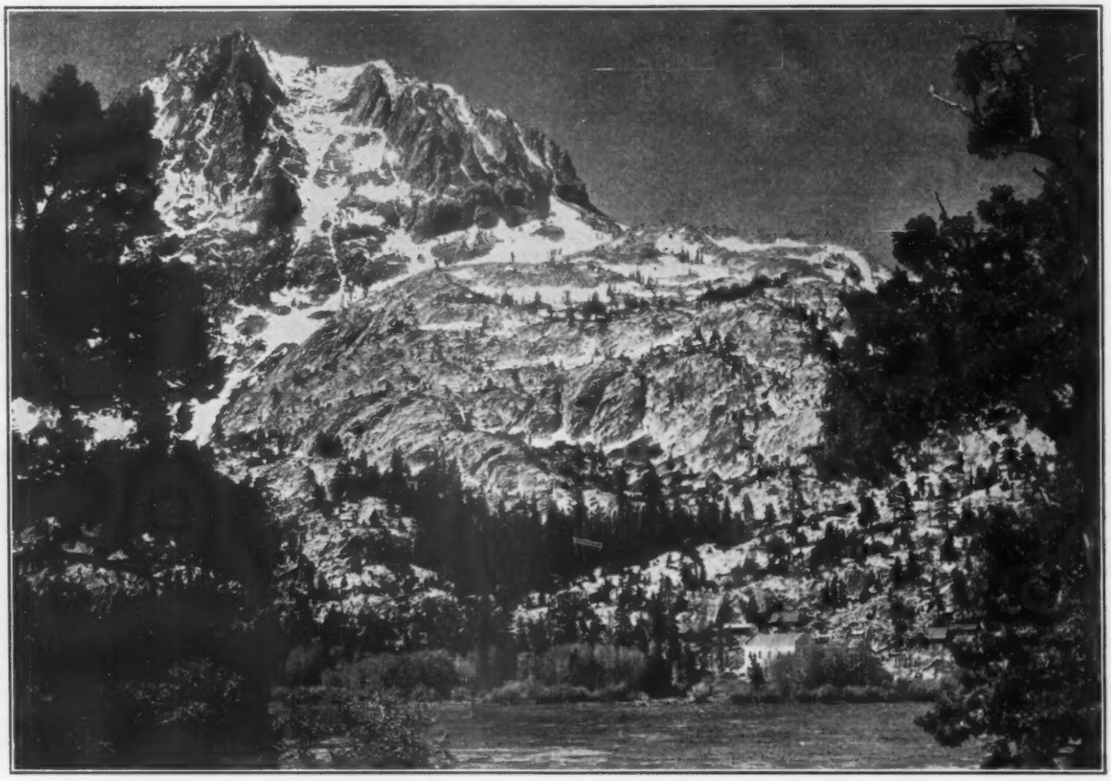
To whom may the government look as prospective purchasers of the power? Principally to the large distributors of electrical energy in southern California where the greatest market exists. Executives of the Southern California Edison Company, the largest distributor in that territory, are authority for the statement that this company is not interested in Colorado River power in view of the relative costs of steam-generated power. Transmission line charges more than offset the difference in bus-bar costs of Colorado River hydro power and energy from modern steam stations at or near the load center. If this argument holds for the Southern California Edison Company, then also it should hold for the Los Angeles Bureau of Power & Light, another potential customer for the output of Colorado River generating stations. The railroads have been mentioned as possible purchasers, but their demands would be but a fraction of the total output. Similarly, the Arizona copper mines could use but a small proportion of the plant capacity.

Elimination of these potential markets would prick the Swing-Johnson Bill bubble. If the possibility for revenue from the sale of power is as remote as it appears, then the bill, instead of being an effective means of providing needed flood control and steam regulation, becomes a useless enactment, an empty gesture. A wise course would be to correct this weakness before it is too late.

Admittedly, flood control is a function of the federal government. The Swing-Johnson Bill itself provides that any dam constructed under its provisions shall be primarily for flood control and regulation, secondly for impounding water for irrigation and domestic use, and finally for power purposes. Elimination of power generation would permit of the construction of a low dam that would serve adequately to provide flood control, regulation and storage. Such a program was sponsored by no less an authority on the Colorado River than E. C. La Rue, formerly engineer for the U. S Geological Survey. Certainly the cost of such a dam would not even approximate the $125,000,000 involved in a high dam at Boulder Canyon and probably would be such that revenues from water for irrigation and domestic uses would be sufficient to reimburse the government for its construction.

In the face of these facts an amendment to the Swing-Johnson Bill that would provide for the construction of such a low dam in case the Secretary of the Interior is unable to contract for the power output from a plant located at a high dam appears to be desirable. Such an amendment would provide a means for saving the other benefits of the bill, namely flood control, stream regulation, silt deposition and water storage, should the power prove unsalable.

One might even hazard that it would do much to clarify the present political muddle that darkens the possibility of any immedite development of the Colorado River. With the elimination of the jealousies involved in the power question, it is conceivable that Arizona would be placated, that a compact such as that drafted at Santa Fe in 1922 would be passed by the seven states, and finally, that immediate action would be taken to provide the flood control so essential to the safety of Imperial Valley.



Two of California's Eastern Sierra Hydro Plants

RUSH Creek plant of The Southern Sierras Power Company (above), formerly known as Silver Lake plant, was first built in 1916 at which time one 4,000-kw. unit was installed. Since that time the capacity of the plant has been increased to 10,600 kw. The plant receives its water from the Gem Lake country at an effective head of 1,700 ft. The view of Leevining No. 3 (below) shows Mono Lake in the background. This plant has a single 2,500-kva. machine and operates on the water from Leevining Creek under a static head of 384 ft. Power from these two plants is fed through an 88-kv. transmission line to the company's Bishop control station at which point it enters the main system feeding into Nevada and southern California.

Residence Lighting --- Engineered

By J. R. Cravath

Consulting Illuminating Engineer, San Francisco.

THE lighting of art galleries and the principles now generally accepted for such lighting among those skilled in the art have been fairly well worked out and applied in a number of good examples in the past twenty years. The principles of residence lighting also have been well worked out although the proper application of these principles in any given home is still rare enough to cause special comment when it is found. In the residence of John Hubert Mee, recently built in San Francisco, the problem came up of combining in several rooms of the house, in a pleasing manner, the principles of art gallery lighting and of home lighting. Other lighting features and the extensive use of electricity in the house also make this installation of interest, along with the unusual and thorough manner in which all technical matters were planned and executed.

IN THE habit of working with engineers, Mr. Mee employed a staff of technical advisers when building his home, acting as executive head of the staff. The results obtained point the way to what the home of the future may hope for, when its every detail is given as intelligent thought as any other industry now enjoys.

The owner, Mr. Mee, having been in the habit of working with engineers and technicians of various kinds in his business enterprises, rightly reasoned that the way to get the most satisfactory results in the building of his home would be to employ a staff of technical advisers covering all the principal branches of the work, with himself as executive head to combine, co-ordinate and maintain proper balance between the various branches. As the future occupant of the home he also reasoned that no executive that he could hire would have the same viewpoint or interest as the actual occupant. The results were that much more thorough and scientific consideration was given to the various elements entering into the construction than is at all customary in any kind of residence building; and the completed job shows it.

In the illumination the most interest centers around the living room, dining room and library. In these rooms it was desired to have artificial lighting, the best of its kind for the ordinary purposes of such rooms, and, in addition, to approach as nearly as possible to ideal lighting for the pictures on the walls. In other words, the owner chose to live with his collection of pictures rather than house them separately in a room by themselves, and having reached this decision it seemed reasonable that lighting should be provided that would combine the requirements of the art gallery with those of the living room, library and dining room.

The first question to come up in this connection was the feasibility of using the regular general lighting system of the room for the picture lighting without further reinforcement. It was established at the beginning of these studies that the ordinary general lighting of these rooms must be supplied by indirect method by diffuse reflection from the ceiling supplemented with shaded localized lighting from portable floor and table lamps. The owner's preference for comfort as against unnecessary glare dictated this, as such methods are the only ones yet devised by which glare can be reduced to a negligible quantity.

Of the various indirect methods, cove lighting, lighting from floor or table standards, and lighting from luminaires suspended from the central ceiling area were considered. Cove lighting was at once rejected because if attempted in low rooms of this kind it could not have been done without producing a high degree of illumination above the cove on the wall on which the pictures would be hung, and the wall illumination where the pictures would be hung would be relatively low as compared to the rest of the room. This is just the reverse of the desirable and pleasing effect. To have less illumination on the pictures than anywhere else in the room where picture lighting is an important factor would be neither pleasing nor economical.

The next possibility considered was to use floor and table standards with indirect luminaires placed at various points about the rooms. While the effects secured in this way might be very pleasing and comfortable, it was found impracticable to place them in the right positions to illuminate the pictures, as they would have interefered with the uses of the rooms and with the beautiful views of the Golden Gate for which the large north windows of all three of these rooms form frames. Preservation of these views, as seen by anyone entering these rooms from the south, had to be kept constantly in mind as they were more highly cherished than even the valuable landscape pictures hanging in frames on the walls.

Lighting this room in the conventional way by indirect luminaires hung in the centers was given serious consideration, but it did not fill the requirements for rooms where emphasis was being placed on picture lighting. These rooms were all approximately 20 ft. in width and from 20 to 30 ft. in length. Ceiling heights at the walls were 10 ft. In rooms of such relative dimensions lighting from central indirect luminaires entirely would involve considerable contrast between the illumination in the center of the room and that at the walls. Even if enough light were provided to afford adequate visibility of the pictures, the effect would not be satisfying to the average person interested in the pictures because the pictures would be less illuminated than any other surface in the room. Furthermore, the dimensions of these rooms were such that the brightly illuminated ceiling surfaces would cause annoying reflections where pictures were mounted behind glass.

The foregoing considerations made it seem necessary to design a special system for picture lighting to be

supplementary or independent of the regular room lighting. Studies were first made of the possibility of recessing luminaires in the ceiling, the light to shine through glass plates flush with the ordinary ceiling plaster line. This plan would have necessitated the use of a certain mirrored reflector only made in large sizes as no other reflector approached the light distribution required for this peculiar and unusual condition. This led to the idea of modifying the ceiling so as to permit reflectors to be tilted, and finally the architect and illuminating engineer together worked out the designs here shown in which the ceiling of each room has been designed as to contour and ornamentation to take the necessary recessed luminaires.

In Fig. 1 may be seen the design of the special recessed luminaire installed in the ceilings of the living room, library and dining room for the picture lighting. A 40-watt inside frosted lamp is used with a mirrored showcase lighting reflector. This is back in the space between the ceiling joists. The opening through which the light comes is filled with a circular glass plate of hammered cathedral glass. This glass was chosen as being slightly diffusing in its effects, the idea being to modify the light from the reflector as little as possible while preventing an unsightly view of the recessed lighting equipment from below.

The only part of the luminaire visible from the room is the circular glass plate and the brass door frame in which it is set. Studies were made covering larger luminaires using 150-watt lamps and with a larger number in each ceiling. The 40-watt size adopted is a compromise between desirable quantity of light on the pictures and desirable architectural effect. The result is satisfactory.

In Figs. 2, 3, 4 and 5 may be seen these luminaires in place in the ceilings for which they were designed. Each luminaire is set in an ornamental plaster design. The ceilings of the three rooms are different in architectural treatment but the illumination treatment is practically the same and the recessed luminaire equipment is the same. A cast-iron ring is set in the plaster ornament and the other parts of the luminaire rest upon or are screwed to this ring.

The black sheet-iron collar shown in the cross-section portion of the drawing, Fig. 1, is a light-wasting device upon which the writer claims no patent but which nevertheless performs a very useful part. The reflector not being deep enough for this job without modification, this black sheet-iron collar was put in to put the lamp and reflector further back into the ceiling so they would not be too visible and glaring. A collar of any polished or light colored material would have caused disagreeable reflections buth in the eyes and minds of the occupants of the room.

One end of the library, devoted to pictures, is shown in Fig. 2. This portion is 20 by 20 ft. with a 10-ft. ceiling, and has 14 of the recessed luminaires. The general illumination is from a central, totally indirect luminaire with mirrored reflectors to take three 150-watt lamps horizontally. Well shaded table lamps, selected both for beauty and utility, give pleasing areas of localized light.

Figs. 3 and 4 are of the dining room where important modifications of the original plain ceiling design were worked out by the architect to accommodate the recessed luminaires. This room is about 21 by 19 ft. with 14 recessed luminaires in the ceiling and one behind the arch over the sideboard. The table and general lighting is by totally indirect luminaire with three horizontal mirrored reflectors for 150-watt lamps.

The living room, Fig. 5, is about 20 by 32 ft. with a ceiling 11½ ft. in the center. There are 16 recessed luminaires ranged along the east and west walls. The general lighting is totally indirect from two 300-watt pendant luminaires.

At the left, near the door, is a piece of furniture seldom seen but of interest to the illumination specialist and the oculist. It in an English reading table. The table lamp, which is on the left end is in a fairly good position to light the page without glare from the paper. The position is not ideal but is better than would be chosen by many an unthinking user. The table is long enough and light enough so that it can easily be lifted around to a good reading position in front of an arm chair. It is especially good for holding heavy books in a good reading position. It removes the temptation (that our oculists warn us against) to lay heavy books

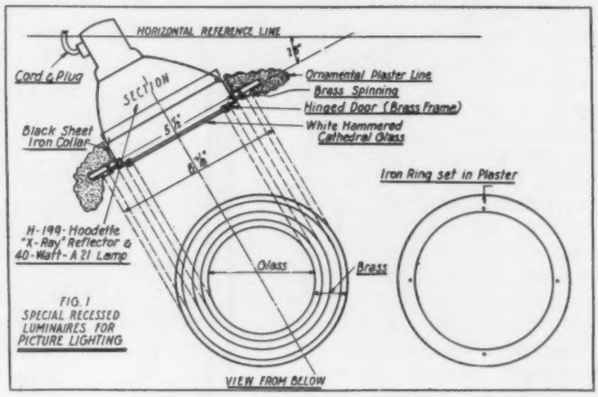


Fig. 1. Details of construction of special recessed ceiling luminaires.

down on a flat table and bend over them for reading, as it has an adjustable book rack which brings the page to the best possible reading position. It is now recognized that the position of the page sufficiently elevated as in this case removes one of the contributing causes of myopia (near sightedness), and it often happens that those most predisposed to myopia are the very ones who lack physical strength to make it easy to hold a book in the proper position.

The illumination obtained on the picture-hanging spaces of the walls in the three rooms in which the recessed luminaires were used is approximately as follows:

	Foot-candles on walls in picture hanging zones.
Dining-room walls: recessed luminaires only	1.5 to 2.5
Dining-room walls: center luminaire only (with this condition the foot-candles on the dining table were 4.5)	0.6 to 1.9
Dining-room walls: both recessed and center luminaires	2.1 to 4.4
Living-room walls: recessed luminaires only	1.3 to 2.5
Living-room walls: center luminaire only	1.2 to 1.5
Living-room walls: both recessed and center luminaires	2.5 to 4.0
Library walls: recessed luminaires only	1.3 to 2.0
Library walls: center luminaires only	1.2 to 2.0
Library walls: both recessed and center luminaires	2.5 to 4.0

The reception hall is shown in Fig. 6. It is lighted from luminaires which consist of Ivanhoe Keldon, semi-indirect enclosing units, around which is ornamental metal work which completely disguises their cold, commercial appearance. A special luminaire with a closed top was chosen here instead of an open-top, indirect luminaire because of the unpleasing appearance of an open-top reflector from above to persons coming down the stairs.

In three large family and guest bedrooms the general lighting is by totally indirect luminaires using mirrored

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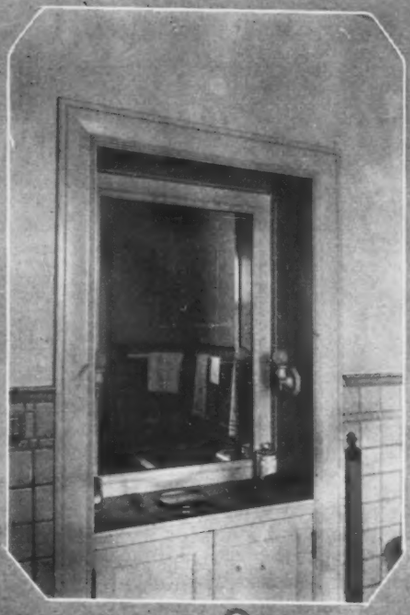
THESE pictures show the effect of engineered residence lighting. (2) A view of the library. (4) The dining room. (5) The living room showing recessed luminaires on both sides of the ceiling. (6) The reception hall lighted with semi-indirect enclosing units. (7) Method of lighting full-length mirror in one of the bedrooms. (8) Shows proper mounting height of brackets for lighting bathroom mirror.



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reflectors. Portables are placed at the head of each bed and various other places as needed. There are a number of full-length mirrors built into doors in bed and dressing rooms. The typical lighting of these is shown in Fig. 7. The shaded bracket above the door is controlled by a switch alongside the door. Reflected in the mirror are two portable bed stand lamps and the telephone with the telephone keyboard on the wall. The radio loudspeaker connected with the radio receiving set in the library is seen on the right.

A typical method of lighting short mirrors used in this house is shown in Fig. 8. Frosted lamps are mounted on brackets 4 ft. 3 in. from the floor, avoiding the common mistake of placing mirror lighting brackets so high that a shadow is cast under the chin of the user.

In the five servants' bedrooms and in the kitchen and pantry semi-indirect luminaires of the Keldon type were chosen as being neat in appearance, easily maintained and free from glare. In the 2-car garage, Fig. 9, there are three ceiling luminaires along each side, close to the walls as shown, and a row of three along the center line of the ceiling. Those along the side walls have Holophane No. 983 show-window reflectors pointed away from the wall and toward the cars. In the center between the cars are three Holophane No. 963 concentrating reflectors to throw light down between the cars. With this arrangement there is good light for washing and polishing around the cars at all points. For mechanical work there is a portable cord and lamp for close places and a light over the workbench at one side of the garage with a concentrating reflector.

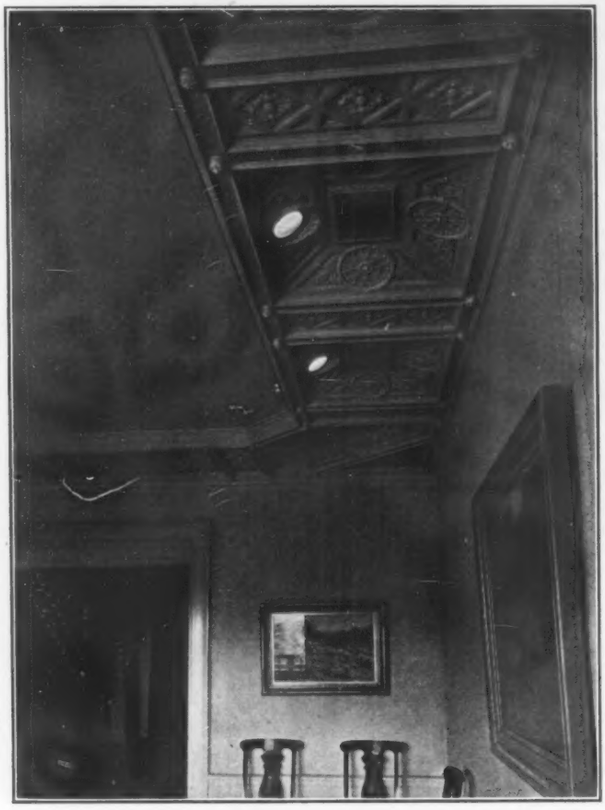

Fig. 3. Ceiling luminaires in place in ceiling ornamentation.

Liberal use is made of three and four-way switches for controlling lights from various points to secure maximum convenience and efficiency. The larger luminaires are in many cases wired for two intensities. The owner rightly considered efficiency in everyday routine operation to be as important for members of his family and servants as for the managers and operators of an industrial plant.

Although the regular heating equipment of the house is by hot water, some provision is made for emergency electric heating in a few rooms. Electric motors are in regular use on the oil burner of the hot water boiler, on the compressor of the hot water thermostatic control system, on the washing machine, two wax floor polishers, hair dryer, electrola, and laundry ironing machine.

Fig. 9. Lighting units in double garages so placed as to give adequate illumination for washing and polishing cars.

All wiring, including the telephone wiring, is in galvanized conduit. Some idea of the extent of the provision for the use of electricity in this house can be obtained from the 400-amp. service switch fused for 350 amp. For a house of about 30 rooms not depending on electric heat this indicates quite adequate wiring for the fullest enjoyment of electric conveniences.

Much study was given by Mr. Mee to the convenience and simplicity of the telephone and signaling systems with results that have been eminently satisfactory to the occupants. With the exception of the front door and tradesmen's entrance doorbells the signaling and talking within the house is all done through The Pacific Telephone & Telegraph Company's intercommunicating system which is also connected with the public exchange. This consists of a 12-station intercommunicating system with two trunk lines to central. Under this system calls may be made or received at any one of these 12 stations (except that provision for calling outside the house may be omitted at any of the stations where outside calling is not desired) to or from stations inside or outside the house.

The front-door push button operates four bells. There is also a pear push on this circuit in No. 1 bedroom for use in case of illness so that the patient can call by ringing the front-door bells, using some code signal that will not be confused with the ordinary ringing of the front door.

The following contributed to the success of the features described in this article: Louis M. Upton, architect; J. R. Cravath, illuminating engineer; Decker Electrical Construction Company, electric wiring; Curtis Lighting, Inc., reflectors and holders for indirect and recessed luminaires; The Bradley & Hubbard Manufacturing Company, metal work of fixtures; North End Manufacturing Company, metal work of recessed luminaires.

Utah Committee Analyzes Colorado River Development

FOR the purpose of ascertianing, analyzing and publishing the facts respecting proposals for the utilization, control or development of the Colorado River, particularly as they pertain to Utah's interests, The Utah Associated Industries and the Utah State Farm Bureau have organized a Colorado River Fact-Finding Committee under the chairmanship of James J. Burke, Salt Lake engineer. Already three reports containing conclusions and recommendations have been issued.

The first report outlines a preliminary course of procedure of which the following is a summary:

1. That there first be brought about an accord among the seven states.
2. That this understanding be effected through a conference of the duly authorized representatives of the state concerned.
3. That the sole purpose and business of this conference shall be to assist the lower states (California, Arizona and Nevada) to settle any existing differences and to arrive at a definite understanding among themselves on all points now at issue between them.
4. That the representatives of the upper states (Colorado, Wyoming, New Mexico and Utah) acting jointly and unitedly, if called upon, lend their good offices to the lower states to bring about such an understanding.
5. That the upper states shall make it clear at this time that they will not participate in the consideration of any other phase of the subject until the lower states have reached this amicable and definite settlement.
6. That the seven states shall then ratify unqualifiedly and unconditionally the so-called Santa Fe Colorado River compact.
7. That Congress shall thereupon set its seal of approval upon the compact.
8. That the consideration of legislation dealing with the Colorado River development shall then, and not until then, proceed.
9. That the influence and active interest of all public spirited citizens in the seven states shall be exercised with the national administration, with Congress and with the authorized public officials in the seven states, to execute this program in its entirety and in the order herein presented.

In support of the above outline of procedure the committee sets forth that such a program "will stay any precipitate action that may later prove an economic blunder and an unwarranted burden upon the taxpayers, and open up the floodgates of exhausting litigation and recurring collisions between otherwise friendly states and neighbors."

Protection to the Imperial Valley is the subject of the second bulletin. After research and investigation the committee recommends:

1. That the Colorado River development shall be studied under the following distinct heads: (a) flood and silt control; (b) water for irrigation; (c) domestic water supply; (d) all-American canal; (e) generation of power.
2. That in this study, economic values and general public interest only shall be considered as against any possible political or sectional advantages.
3. That this same study shall separate clearly and distinctly the immediate from the remote needs.
4. That this acid test as set forth in (2) and (3) shall be applied to all plans and projects that purport to be for the purpose of developing the Colorado River.

In its report the committee admits that an emergency exists with respect to flood control for Imperial Valley and urges that immediate action to remedy this situation should be taken by the federal government. It points out, however, that contrary to statements made, the danger in Imperial Valley is confined to property alone and that a flood would in no measure jeopardize the lives or safety of human beings. The report states that "continued delay to take appropriate action for protection against river outbreaks in the Imperial Valley may do away entirely with the problem of flood control for the very reason that another inundation may write the last chapter of that great experiment in intensive fruit-raising, dairying and agriculture."

Granting that the Imperial Valley situation represents the only immediate necessity, the committee believes that with the valley safe from the flood menace, the nation can then turn its attention to other aspects of the Colorado River development. The committee points out that flood control is an international question involving Mexico and urges that a joint committee of engineers representing the two counties be appointed for the purpose of reaching an agreement on all controversial issues involving mutual interests. Finally the committee particularly recommends that the Colorado River settlement should not be tinctured with trading or politics.

In the third report a domestic water supply for Los Angeles and the power situation are the subjects discussed. After a careful study of engineering data available the committee points out that full development of the water resources of the Owens Valley and Mono Basin regions will provide Los Angeles with a domestic water supply sufficient for a population of 8,000,000 available to the city by gravity flow. Discussing the Colorado River as a source of domestic water supply the report states:

"Water from the Colorado River to Los Angeles would require an aqueduct 271 miles long. It would require tunneling to the extent of 78 miles. One such tunnel alone would be approximately 27 miles long. The canal in this construction would be about 170 miles long. The pump lift of water into the canal would be nearly 1,700 ft.

"The original expense of construction would approximate one-quarter billion dollars."

The committee expresses both surprise and amazement "at these findings and discoveries in view of the apparently prevailing opinion that Los Angeles must look immediately for new sources of water."

Both water supply and power generation were considered by the committee from the standpoint of determining what proportion of the cost of flood and silt control works could be borne by these supplementary developments.

In reviewing the power situation the committee attempted to find answers for the following questions:

What is the relation between supply and demand of power in the territory to be served by this proposed plant?

Can a new market be found for this additional power?

Can the power from the Colorado River be brought into that territory and meet present competition?

Who would likely contract for that power?

In its studies the committee found that not only are present power requirements met, but that there remains a substantial power surplus in southern California. It reports that railroad electrification would require only a small proportion of the power generated at a plant on the Colorado River. Rates, it found, had a downward trend. The committee doubts if Colorado River power could compete in cost with power generated in southern California at the present time from steam without giving any consideration to decreasing cost of steam-generated power. It concludes its study of the power situation with the statement that "the committee failed to find any condition or hopeful signs that seemed to justify or warrant any corporation, public or private, to hazard a long time contract for this proposed new power."

The committee makes the appeal that facts rather than sentiment govern any investigations or any action that the government may take. It says, "in a question so stupendous as the one under consideration the committee contends that there is no place for lurid and extravagant statements calculated to impress and capture the unthinking and uninformed. Facts alone should decide the whole question."

A report on irrigation and reclamation as related to the development of the Colorado River is now being prepared by the committee and will be issued shortly.

Christmas

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Detailed description of the Christmas lighting campaigns of these two communities may be found on pages 350 and 351.

Communities—Denver and Salt Lake

FOR many seasons Denver and Salt Lake City have been known as the Christmas cities of America, each garbed in electric light for the holidays. Denver (left) and Salt Lake City (this page) homes and buildings as they appeared last year.

ENGINEERING THE COMMER

¶ Five Years' Selling Experience Is Co-ordinated in Building Up a Working Plan for the Salesmen of the San Joaquin Light & Power Corporation.

With a Connected Kilowatt for System, Districts

WHEN it comes to bogeys, whether for golf, bridge or just plain business, one man's idea is about as good as another's. Used indiscriminately, bogeys may be one man's meat or another's poison. Whether dignified by the title "quota" or merely feared as "bogey" these prods are known to all salesmen, and more particularly to their sales managers, as highly stimulating bits of sales technique which are used with more or less success in almost every sort of sales effort.

When bogeys are reduced to a fine art, however, they may become objects of awe and admiration. Such a bogey system is that of the sales department of the San Joaquin Light & Power Corporation, Fresno, Calif. In its ramifications and in its clarity and graphic simplicity is is worthy of the searching and critical scrutiny of any sales manager who has ever cast a bogey.

A. E. Wishon, vice-president and general manager of that company, because he is a rather busy individual, has little patience with generalities. He likes to see results in concrete form and to visualize in only a little less concrete manner the possibilities for the immediate future. The sales department has responded to the demands he has thus set up in a way which leaves very little to the imagination or to vague hope.

Desirous of plotting out as accurately as practicable the sales or load-building possibilities for the year and then of recording carefully the actual results as against the plotted quotas, A. M. Frost, sales manager of the company, and M. B. Lohse, assistant sales manager, decided to examine carefully the sales records for a five-year period. No shorter or more cursory investigation, they felt, would give them an accurate knowledge of what could be expected from the sales force. In other words, it was not the intention to set arbitrary quotas, hoping to goodness that they might be reached, but feeling really that they were beyond even fondest dreams.

In short, Mr. Frost wanted a quota that was sound, because based upon past records and experience, and fair, because entirely within reason and predicated upon the proved efficiency of the sales force.

Going back five years for records proved no easy matter. The accounting department did not have the records segregated in the manner in which they would be of most use to the sales department. It required considerable effort to reclassify accounts and to segregate past additions to connected load into the various divisions to which they should be credited. Conversion from horsepower to kilowatts, too, was necessary in many instances because it was desired to maintain the new bogey, at the same time using but one unit of electrical measurement.

When the information as to the past five years had been gathered the opinions of the various district man-

TOTAL ALL SALESMEN

BOGY FOR 1927

Month	Salary for Month	Auto Exp. for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K.W.	Monthly Rev. @ $11.00 per K.W.	Domestic & Commercial Combination Service. K.W.	Monthly Rev. @ $12.50 per K.W.	General Power K.W.	Monthly Rev. @ $25.50 per K.W.	Agric ltural Power. K.W.	Monthly Rev. @ $34.00 per K.W.	Total Monthly K.W.	Total Rev. per Month All Classes	Cost per K.W.	Cost per Dollar of Revenue
January	$ 3130.00	$ 699.05	$ 148.94	$ 3977.99	179.16	$ 5553.96	844.71	$ 10558.88	679.55	$ 17328.53	1213.75	$ 41307.50	2917.17	$ 76,748.87	$ 1.34	$ .052
February	3130.00	699.05	148.94	3977.99	179.17	5554.27	772.26	9653.25	606.90	15475.95	1257.75	42763.50	2816.08	73,446.97	1.41	.054
March	3130.00	699.05	148.94	3977.99	181.26	5619.06	761.56	9519.50	590.90	15067.95	1757.25	59746.50	3290.97	89,953.01	1.21	.044
April	3130.00	699.05	148.94	3977.99	176.93	5484.83	717.26	8965.75	717.14	18287.07	1676.80	57011.20	3288.13	89,748.85	1.21	.044
May	3130.00	699.05	148.94	3977.99	162.62	5041.22	730.56	9132.00	579.99	14789.75	1380.55	46938.70	2853.72	75,901.67	1.39	.052
June	3130.00	699.05	148.94	3977.99	156.11	4839.41	785.26	9815.75	698.19	17803.84	1082.25	36796.50	2721.81	69,255.50	1.46	.057
July	3130.00	699.05	148.94	3977.99	150.82	4675.42	761.66	9520.75	685.39	17477.45	839.30	28536.20	2437.17	60,209.82	1.63	.066
August	3130.00	699.05	148.94	3977.99	151.25	4688.75	683.01	8537.63	573.10	14614.04	772.55	26266.70	2179.91	54,107.12	1.82	.074
September	3130.00	699.05	148.94	3977.99	175.67	5445.77	667.71	8346.37	607.34	15487.17	697.85	23726.90	2148.57	53,006.21	1.85	.075
October	3130.00	699.05	148.94	3977.99	173.78	5387.18	791.66	9895.75	484.54	12355.77	823.20	27988.80	2273.18	55,427.50	1.75	.071
November	3130.00	699.05	148.94	3977.99	175.27	5433.37	796.06	9950.75	545.34	13906.17	752.20	25574.80	2268.87	54,865.09	1.75	.072
December	3130.00	699.05	148.94	3977.99	186.38	5777.78	878.51	10981.37	523.34	13345.17	931.00	31654.00	2519.23	61,758.32	1.58	.064
TOTAL	$37560.00	$8388.60	$1787.28	$47735.88	2048.42	$63501.02	9190.22	$114877.75	7291.72	$185938.86	13244.45	$450311.30	31774.81	$814,628.93	$ 1.50	$ .059

SIGNED FOR 1927

Month	Salary for Month	Auto Exp for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K.W.	Monthly Rev. @ $11.00 per KW.	Domestic & Commercial Combination Service K.W.	Monthly Rev. @ $12.50 per K.W.	General Power K.W.	Monthly Rev. @ $25.50 per K.W.	Agricultural Power K.W.	Monthly Rev. @ $34.00 per K.W.	Total Monthly K.W.	Total Rev. per month All Classes	Cost per K.W.	Cost per Dollar of Revenue
January	$ 2955.00	$ 718.54	$ 135.90	$ 3809.44	223.54	$ 6929.74	1025.25	$12,815.69	698.17	$ 17,803.26	881.57	$ 29,973.38	2828.70	$67,522.04	$ 1.35	$ .056
February	2955.00	724.80	110.45	3790.25	213.67	6623.77	977.29	12,216.15	892.13	22,749.08	1061.14	36,078.76	3144.21	77,685.66	1.21	.049
March	2965.00	809.44	181.43	3955.87	319.29	9898.02	1424.51	17,806.38	1104.64	28 ,168.21	1688.41	57,405.92	4537.15	113,278.73	.87	.035
April	2775.00	789.02	154.31	3718.33	228.69	7089.24	1172.44	14,655.50	579.56	14,778.78	1181.78	40,180.52	3162.43	76,702.74	1.17	.048
May	2775.00	720.95	114.90	3610.85	403.56	12510.36	1156.00	14,450.00	739.02	18,485.01	1028.29	34,961.86	3326.87	80,767.23	1.07	.045

System quota chart and record of actual results.

CIAL JOB

Quota Sales Plan and Salesmen

agers were solicited as to the sales possibilities in their respective territories. By co-ordinating all such information it was possible for Mr. Frost and Mr. Lohse to determine a system quota and then break this quota up into district quotas.

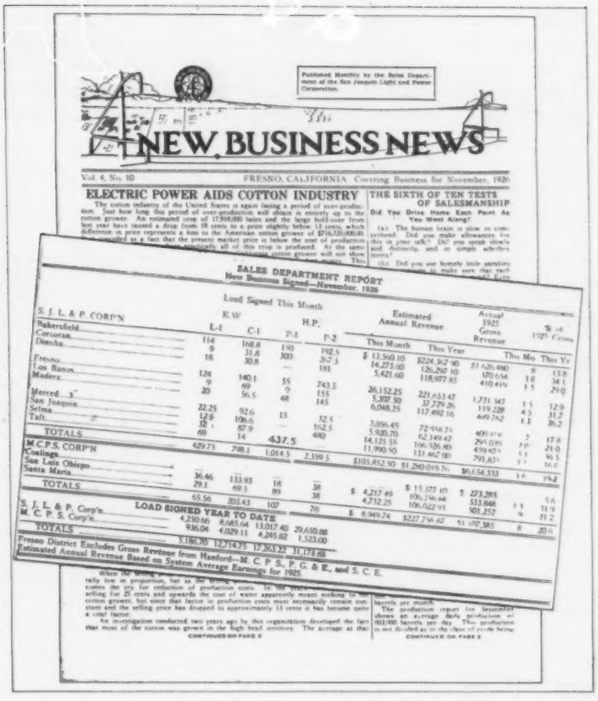
The past performances of the individual salesmen were then studied and the district quotas again divided up among the salesmen according to their past ability, their specialties and other conditions which might affect them, such as crop conditions or general business conditions or trends.

A chart was worked out for each salesman, with similar charts for districts and for the system, the latter two being summaries of the salesmen's charts.

The month by month quota and yearly totals expected will be seen in the accompanying reproductions of both the system chart and a typical salesman's chart. Upon them will be seen the quotas set for salaries, monthly auto expenses, miscellaneous expenses and total expenses; the amount of domestic, commercial and street lighting load expected, in kw., and the revenue expected from such load at $31 per kw. per month; the amount of domestic and commercial combination service, in kw., and the revenue expected at $12.50 per kw.; the amount of general power load, in kw., and the revenue expected at $25.50 per kw.; the amount of agricultural power, in kw., and the expected revenue at $34 per kw.; the total monthly kw. and the total expected revenue per month from all classes of load; the cost per kw. and the cost per dollar of revenue.

While the expected revenue from various classes of load at first glance may seem high, it must be remembered that these figures were arrived at from a careful survey of five years' revenue from these classes of business.

On the same chart, and with the same headings, space was provided for entries of the actual results obtained, month by month, during the year. Being on the same sheet it is a simple matter to compare the actual results in each case with the estimate made in the quota. It will be seen from the accompanying reproductions of the charts that in both the system chart and that for a typical salesman the actual results follow the estimates which were previously made very closely, in many cases exceeding the quotas, in some cases and under certain classifications, not quite making the quota.



NEW BUSINESS NEWS

ELECTRIC POWER AIDS COTTON INDUSTRY

THE SIXTH OF TEN TESTS OF SALESMANSHIP

SALES DEPARTMENT REPORT

Monthly salesmen's newspaper and its sales department report.

To facilitate the entries, each salesman is given a strip containing the classifications of the chart upon which he enters his results for the month, turning this strip in to Mr. Lohse to be entered on the office chart. In this way the salesman has an opportunity to check up on himself and to compare his sales results with a definite standard, a feature which is stimulating and self-analyzing in its effect.

As a supplemental method of keeping the sales picture clearly in mind, a graph chart is drawn for each salesman, for each district and for the system. As will be seen in accompanying illustrations, these graphic charts are kept upon a basis of kw. added or signed for the months of the year. A solid line is used to indicate the quota set and a dotted line drawn and extended each month to show the actual results.

SALESMAN - A TYPICAL
DISTRICT - (RURAL)
BOGY FOR 1927

Month	Salary for Month	Auto Exp. for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K.W.	Monthly Rev. @ $31.00 Per K.W.	Domestic & Commercial Combination Service K.W.	Monthly Rev. @ $12.50 per K. W.	General Power K.W.	Monthly Rev. @ $14.00 Per K.W.	Agricultural Power K.W.	Monthly Rev. @ $19.00 per K. W.	Total Monthly K. W.	Total Rev. per Month All Classes	Cost per K.W.	Cost per Dollar of Revenue
January	$ 175.00	$ 35.68	$ 5.69	$ 216.37	6.25	$ 193.75	50.0	$ 625.00	10.0	$ 255.00	129.0	$ 4386.00	195.25	$ 5,459.75	$ 1.11	$ .040

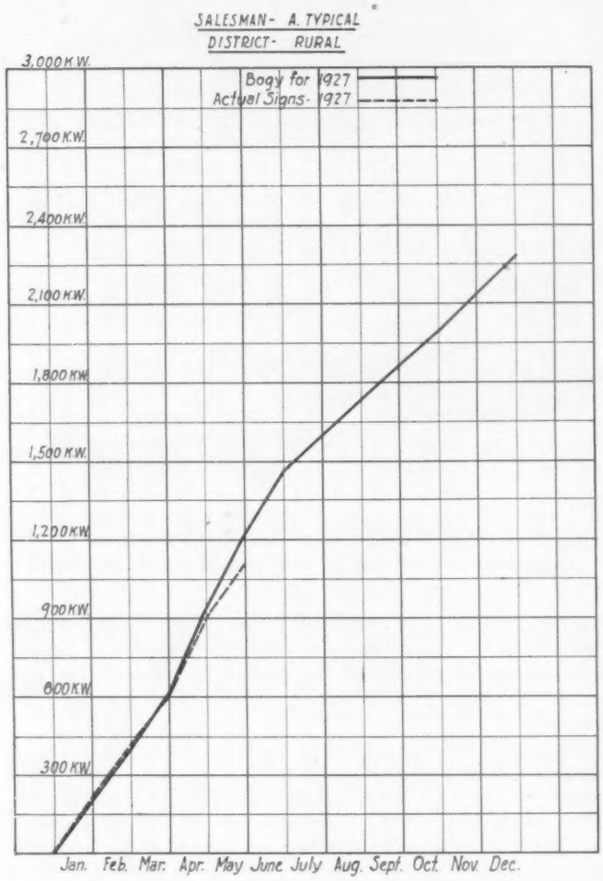
SIGNED FOR 1927

Month	Salary for Month	Auto Exp. for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K. W.	Monthly Rev. @ $31.00 per K.W.	Domestic & Commercial Combination Service K. W.	Monthly Rev. @ $12.50 per K. W.	General Power K.W.	Monthly Rev. @ $14.00 per K. W.	Agricultural Power K.W.	Monthly Rev @ $19.00 per K.W.	Total Monthly K.W.	Total Rev. per month All Classes	Cost Per K.W.	Cost per Dollar of Revenue
January	$ 175.00	$ 30.84	$ 15.50	$ 221.34	21.4	$ 663.40	46.6	$ 582.50	4.46	$ 113.73	136.13	$ 4628.42	208.59	$ 5988.05	$ 1.06	$ .036

Typical salesman's quota and actual result chart.

A comparison of both lines reveals that the general trend for the system is over the quota. The particular salesman whose chart is reproduced here may be seen to be following his quota very closely.

As an additional stimulus, and to promote team-work among the salesmen, give them selling ideas and point



the way to increased business, a small monthly newspaper is issued by the sales department, called "New Business News." A regular feature of this publication is the monthly sales department report, showing by districts the load signed during the month, the estimated annual revenue, the actual year's gross revenue and the percentage of the gross represented by the sales effort.

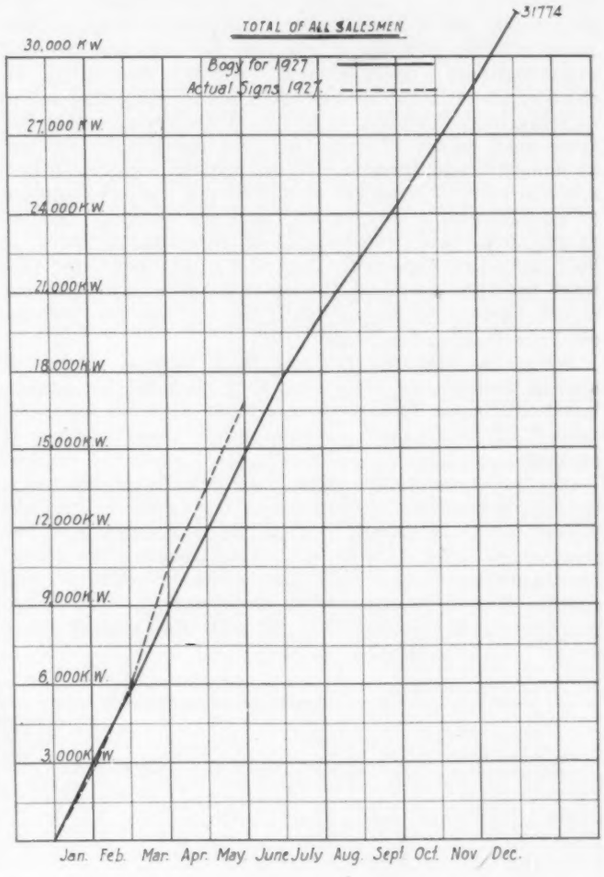
Attention is called to special sales possibilities, such as the opening of new districts and industries, and the development of new types of apparatus which should find a field in the territory covered by the company. The development of a new use for electricity in connection with farming, the possibilities for electrical development in oil fields, and other similar subjects are treated.

The matter-of-fact natures of both Mr. Frost and his able lieutenant, Mr. Lohse, do not permit of much bunk in the treatment of these or any other development ideas. Their demand for concrete and tangible results is mirrored in the straightforward and concise statements published in this bulletin. The usual flowers and air-filled phrases are as absent in the columns of this salesman's bulletin as other forms of fancywork are eliminated from the entire sales set-up, not forgetting the casting of the budgets and quotas.

This plan is in operation over the 13 districts of the San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation, its subsidiary. From one to three salesmen are allocated to each district. The salesmen are well paid and results are expected of them, according to Mr. Frost. Practically all of them have been with the company for a number of years and are well grounded in their sales experience. The low cost per kw. and per dollar of revenue indicated by the results for the first five months of the year speaks eloquently for the system and for the sales force.

"When a salesman has been trained into the requirements of the company," says Mr. Frost, "he becomes a valuable asset to the company. We have never gone in for a big sales force or for putting on a lot of salesmen for a few campaigns and, after training them to the point where they begin to produce, letting them go because the campaign is over.

"Our men have all been with us for a long time. We pay a little better than the average but we expect better and steadier results, and I believe we are getting them. Our sales effort is continuous and this method of setting the pace is the best we have found for keeping the load coming along steadily month after month. This method of measuring quotas entirely by the number of kilowatts connected each month and the



revenue to be expected from such load, too, I believe is unique. Anyway it is getting us results and that's all that matters."

It may be said for the plan that it should find wide appeal in power company operations for it is an excellent example of engineering technique in estimating as applied to a commercial problem.

Synchronous Condensers

As Applied to an Intricate Transmission System

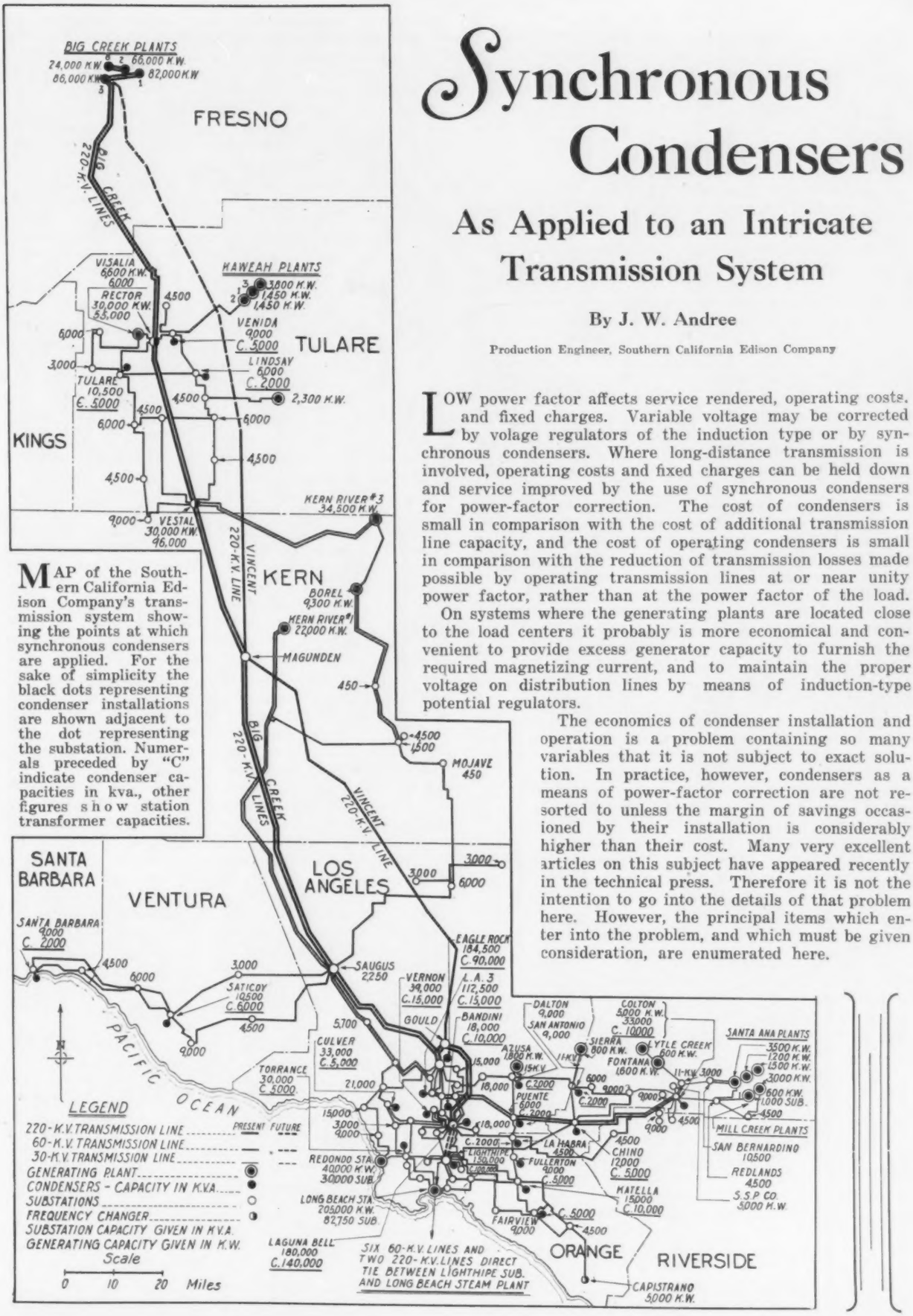
By J. W. Andree

Production Engineer, Southern California Edison Company

LOW power factor affects service rendered, operating costs and fixed charges. Variable voltage may be corrected by volage regulators of the induction type or by synchronous condensers. Where long-distance transmission is involved, operating costs and fixed charges can be held down and service improved by the use of synchronous condensers for power-factor correction. The cost of condensers is small in comparison with the cost of additional transmission line capacity, and the cost of operating condensers is small in comparison with the reduction of transmission losses made possible by operating transmission lines at or near unity power factor, rather than at the power factor of the load.

On systems where the generating plants are located close to the load centers it probably is more economical and convenient to provide excess generator capacity to furnish the required magnetizing current, and to maintain the proper voltage on distribution lines by means of induction-type potential regulators.

The economics of condenser installation and operation is a problem containing so many variables that it is not subject to exact solution. In practice, however, condensers as a means of power-factor correction are not resorted to unless the margin of savings occasioned by their installation is considerably higher than their cost. Many very excellent articles on this subject have appeared recently in the technical press. Therefore it is not the intention to go into the details of that problem here. However, the principal items which enter into the problem, and which must be given consideration, are enumerated here.



MAP of the Southern California Edison Company's transmission system showing the points at which synchronous condensers are applied. For the sake of simplicity the black dots representing condenser installations are shown adjacent to the dot representing the substation. Numerals preceded by "C" indicate condenser capacities in kva., other figures show station transformer capacities.

FIXED CHARGES

In Favor of Condenser Installation	*Against Condenser Installation*
Reduction in fixed charges occasioned by the reduction in current-carrying capacity required in generators, switches, transformers, transmission lines, voltage regulators and substations.	Fixed charges on condenser installation including bus section, transformers, switches, condenser, instruments, auxiliary apparatus, and a portion of the general investment in the substation building and property which may be assigned to the condenser installation.

OPERATION

Reduction of losses in excitation, generators, transformers, transmission lines, and all current-carrying parts.	Cost of power required to operate condenser, operating labor and maintenance cost.

A system with all generators operating at the average power factor of the load will require considerably less kva. production capacity than will be required by one in which the generators are operated at unity power factor and the magnetizing current is furnished by condensers. This is due to the vector-direction of the

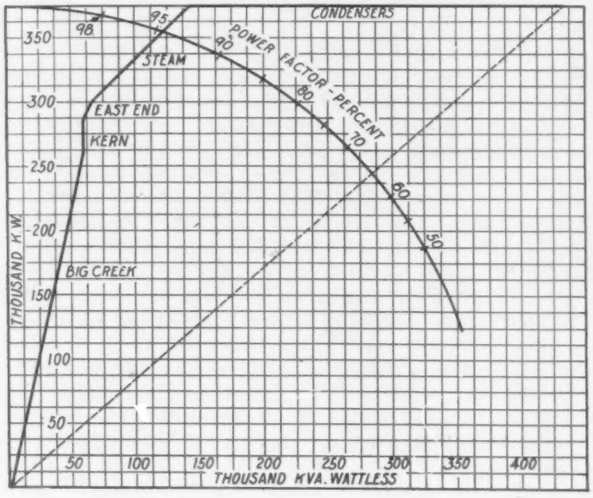


Fig. 2. Power-factor chart for the 50-cycle system as of 8:30 a.m. July 26, 1927.

currents in the latter case not being collinear. This condition may be seen readily from inspection of Fig. 2. In power-factor correction calculations the losses to be considered are on the increment of the reduced current due to power-factor correction which, on a fully loaded line, usually has a percentage value about double that of the full-load loss expressed in percentage.

For a given case it probably is justifiable to figure fixed charges only on the conductors of transmission lines directly affected by a reduction of current due to power factor correction. However, in general, the transmission properties as a whole should be included because eventually, with the growth of the system, additional transmission lines will be required, and, with unity power factor operation rather than operation at the power factor of the load, the date at which such additional lines must be completed may be deferred in proportion to the reduction in the load current on the lines.

A company with condensers located at all important load centers is in a position to give much steadier voltage regulation than one having no condensers and depending entirely upon induction-type voltage regulators for satisfactory distribution voltages. With direct inter-connected systems the condenser provides an excellent means for controlling the current interchange between the various component parts of the interconnected systems.

The Southern California Edison Company is the outstanding pioneer in the adaption of synchronous condensers as a means of power factor correction and system voltage regulation. The territory served by that company comprises almost all of the developed section of the southern half of the State of California, while its large source of hydroelectric power is situated about 250 miles from the load center. Economical development of sources of hydroelectric power has dictated that, for seasons of normal stream flow, plants be constructed of sufficient capacity to operate at full load for a period of about six months per year and at a reduced capacity, depending upon the available water, for the rest of the year. These conditions have made possible the layout of a production and transmission system which, with the use of synchronous condensers, provides a very economical system from the viewpoint both of operating and capital invested.

A map of the company's transmission system is given in Fig. 1, showing generating stations, substations, synchronous condensers and frequency changers, with corresponding capacities and principal transmission lines. The center of load of this system is in the vicinity of Los Angeles and the large source of hydroelectric power is at Big Creek, about 250 miles north of Los Angeles.

That portion of the Edison company's system situated in the San Joaquin Valley in Tulare County is operated at 60 cycles. The remainder of the system is operated at 50 cycles. The small hydroelectric plants located on the Kaweah and Tule Rivers are operated at 60 cycles directly on the 60-cycle system. The Kern River No. 3 plant operates at either 50 or 60 cycles, depending upon the demand for power on the 60-cycle system. There also are two other ties between the two systems through synchronous motor-generator sets; one, a 30,000-kw. set at the Rector substation, and two 15,000-kw. sets at Vestal substation.

A typical power-factor diagram of the 50-cycle portion of the Edison company's system is shown in Fig. 2. At the particular time of the year for which this diagram is shown, the hydroelectric plants were carrying maximum output in kilowatts, due to availability of large quantities of water. Under such conditions these plants carry a load in kilowatts equal to or in excess of their kva. rating. Hence it becomes necessary to operate them at nearly unity power factor in order to avoid overloading the generators with current. The diagram indicates that the average power factor of the hydro plants was about 98 per cent, and that the steam plant was operated at a power factor of about 68 per cent or at nearly the average power factor of the load. The deficiency in exciting current from the hydro plants is made up by operation of synchronous condensers.

With economical loading conditions of the hydroelectric plants their power factor usually is maintained at about 90 per cent, under which conditions these plants furnish a wattless component of about 140,000 kva., which obtained at but a slight increase in current above the minimum or unity-power-factor current. The increase in transmission losses occasioned by operation at a 90 per cent power factor instead of unity power factor is very small in comparison with the value of this additional magnetizing effect on the system.

The average power factor of the load, as shown by the diagram of Fig. 2, is 65 per cent. This may seem rather low, but the load is almost entirely a power load, a large portion of which is agricultural pumping load. The latter usually has a very low power factor.

Investigations of the economics of condenser operation on this company's system indicate that the com-

(1)

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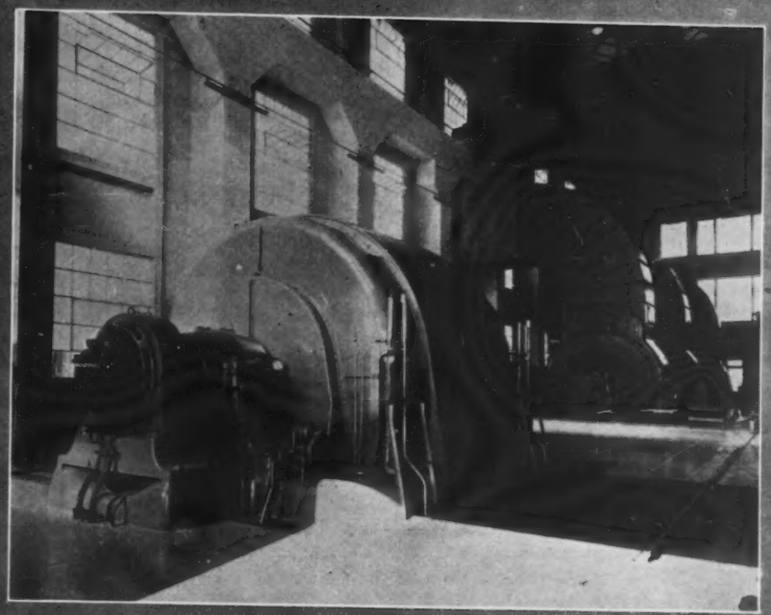
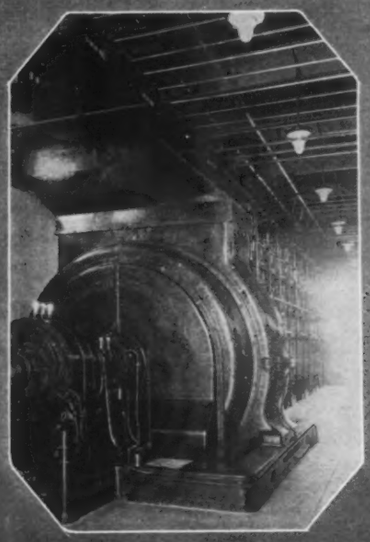


(3)

Condensers on the Edison System

SEVERAL typical installations: (1) A 5,000-kva. unit at Venida in the San Joaquin Valley. (2) An old-timer at Puente, 2,000 kva. (3) A 50,000-kva. in foreground, and three 30,000-kva. machines at Laguna Bell. (4) Katella, on the southern portion of the system, 10,000 kva. (5) Eagle Rock substation, one of the earliest large installations, two 15,000-kva. and two 30,000 kva. units.

(5)



(4)

pany can afford to expend about 15 per cent of its total operating costs and fixed charges (of and on production and transmission properties) in the effort to correct the power factor to unity at all important load centers.

It is sometimes claimed that systems such as this should have excess steam generating equipment and that, during periods of heavy load on the hydroelectric system, the hydroelectric plants should be operated at unity power factor, and that the steam units should be operated at minimum power load and, in addition, furnish the required system excitation. The only real advantage of this method of operation is that it supplies additional steam reserve capacity in operation for emergency, but it costs about twice as much as the same effect produced with condensers, including fixed charges on the condensers. Steam plants usually are not located at exact load centers. The upkeep on steam power plant equipment operating under the above conditions is very severe. In many cases there would be large losses incurred in transmitting this heavy wattless current from the steam plant to the load centers, and the transmission network voltage would not be in good control.

Much thought has been devoted to the proper location of condensers. In general it is advisable to locate them close to the load. This, however, would necessitate the installation of a large number of relatively small condensers. The cost per kva. capacity of small condensers is much higher than for large ones and there would be considerable difficulty in operating a large number of small ones. The policy of locating condensers only at large load centers which have low power-factor load has been followed by this company, with consideration given to growth and character of the load.

Condensers on this system are operated on a voltage schedule, or at request of the load dispatcher. There is but little difference between the operation of synchronous condensers and other synchronous machines. They are subject to about the same insulation troubles. Probably the largest source of trouble in modern condensers is in the field windings and collector rings. The manufacturers seem to have considerable difficulty in properly supporting the field coils to withstand the centrifugal action of the rotor.

Some of the larger high-voltage condensers have a corona discharge from the armature windings which has caused some anxiety. Manufacturers' endeavors to overcome this by the employment of various kinds of insulation have not been entirely successful. This corona discharge seems to be more severe when the condensers are first placed in operation, and gradually decreases, although some units show an appreciable discharge after two or three months of operation.

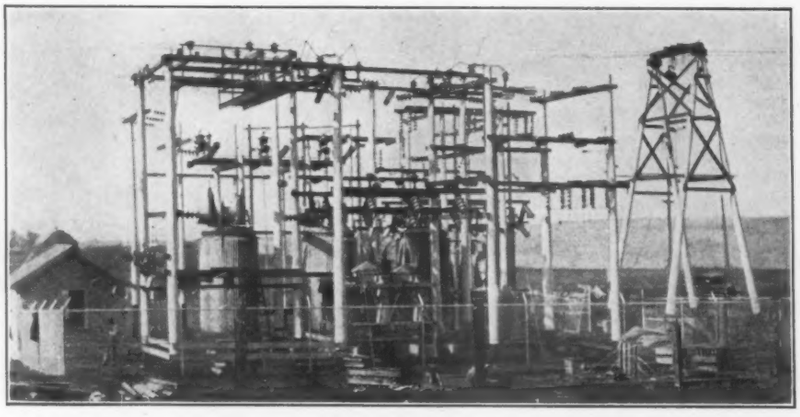
One of the 30,000-kva. condensers at Laguna Bell substation recently had a short circuit in the armature windings. Subsequent inspection of the insulation of the armature coils showed a large number of crater-like holes in the insulation. These holes were of various depths, some shallow and some clear through to the copper. The holes were mostly small, and of various shapes, some about 1/16 in. in diameter on the outside, and others as much as ¼ in. across. The holes were located throughout the entire length of the armature slots but were more prominent near the air ducts.

The cause of the formation of these holes has not been established definitely, but many theories have been advanced, such as: iron filings or chips revolved with magnetic force, causing a drilling action; particles of sand or grit revolved by air currents; static discharge, etc. The static discharge theory is scoffed at because these holes also occur in the insulation on coils which are near ground potential. The windings are star-connected with the neutral grounded.

An interior view of Laguna Bell substation showing condensers totaling 140,000 kva. capacity is shown in the accompanying group of illustrations. The condenser in the foreground is a 50,000-kva., 13.2-kv. unit. Two similar units now are under construction for the new Lighthipe substation. This unit has a closed system of ventilation, the air coolers being located beneath the condenser. This view also shows a portion of the fire-extinguishing equipment with which this unit is provided. In the background may be seen three 30,000 kva., 6.6-kv. condensers with open ventilating systems arranged to discharge heated air through ducts to the outside of the building.

The interior of the condenser room at the Eagle Rock substation also is shown in the accompanying illustration. This view shows two 15,000-kva., 6.6-kv. condensers, and one 30,000-kva., 6.6-kv. condenser. The fourth unit, which also is of 30,000-kva. capacity, is not shown in this view. These are units of an older type than those in Laguna Bell.

A Washington Substation



THE Latah, Wash., substation of The Washington Water Power Company is shown in the accompanying illustration. The station has an installed capacity of 6,000 kva. and acts as a step-down station between the company's 110-kv. trunk transmission line and the local 60-kv. transmission network which serves a rich argricultural area in southeastern Washington. The wood-pole structure shown is typical of the construction utilized by The Washington Water Power Company for this class of substation. Unloading and handling of heavy equipment is facilitated by the tower shown at the right. Latah is about 30 miles southeast of Spokane near the Idaho state line.

The Electrical Supply Jobber as a Banker

By J. L. Kline
President, Western Light & Fixture Company, Los Angeles

EVERY commercial concern has a bank as its silent partner. Neither can succeed without the other. Commercial concerns must have banks and banks must have commercial concerns. The partnership can be made profitable to both if it is based upon mutual confidence, sincerity, frankness and a clear understanding by each of the other's point of view.

All any bank does is to deal in credit and that credit means a promise to pay. The bank makes a charge for the exchange of credit, because it promises to pay on demand, while the borrower promises to pay at some future date. This justifies the interest charge. The bank does no favor to the borrower when it makes a loan, it performs no act of charity; it merely makes an exchange of credit and in doing so earns a profit.

Bankers are thoroughly trained business men, and the ethics, the principles of the banking business are sound. The practice of banking is so standardized and so thoroughly understood by a bank's customers that they experience very little difficulty in enforcing the rules or terms that govern their transactions. Banks have reached this admirable business position only by establishing a standard to work to and by, and it is not impossible for any line of commerce to strive for the same ideals.

IF THE difference between lending money and lending materials is one of name only, then the electrical jobber is a banker. As such he is entitled to demand from the contractor-dealer the same sort of a financial statement that the dealer would present to a banker when seeking a loan. The author, one of the leading Pacific Coast jobbers, enlarges on this idea in a paper which he presented at the last meeting of the Pacific Coast Division of the Electrical Supply Jobbers' Association.

Relations Between Electrical Supply Jobbers and Contractor-Dealer

The relations between the electrical supply jobber and the contractor-dealer could approximate very closely the bank's procedure. There is much room for improvement between these two groups of the electrical industry. As the bank is a partner to commercial concerns and each needs the other to succeed, so is the prosperity of the electrical supply jobber and contractor-dealer so vital each to the other that some adequate and mutually profitable arrangement of the two should be worked out to the advantage of both.

The electragists as an organization are at the moment asking the electrical supply jobber to exchange credit with the contractor-dealer with a discerning that will make it exceedingly difficult for those not worthy to buy on a credit basis, and they are urging the collection of dues outstanding with the firmness of a banker.

Opening New Accounts

There is no more reason why the electrical supply jobber should exchange credit with an electrical contractor-dealer without having certified evidence of the contractor-dealer's ability to use properly and not abuse that confidence, than there would be for a banker to loan money without proper security.

There is no difference in lending money and lending materials—except in the name.

In opening new accounts it is not enough for the electrical supply jobber to satisfy himself only about the order in hand. For the protection of his good customers—for his own protection in subsequent dealings—he should make sure of the capabilities of every new applicant for credit to use that credit to the profit of both customer and jobber.

The uses of credit in the processes of exchange demands utmost frankness of him who promises future value for present value received. Our whole credit structure rests upon confidence on the part of the creditor and good faith on the part of the debtor.

One of the most important sources of credit information is the financial statement. From this statement can be obtained certain facts that are not available from any other source: for example, the details of the credit applicant's assets, liabilities, insurance, encumbrances and in some cases the debtor's income and expenses. These are essential facts, and when fully and accurately stated they reveal whether or not the applicant is entitled to credit.

Very often a workman, starting into the electrical contracting business for himself, little realizes that the contracting game is exposed to perils, which the man ignorant of general business practices cannot foresee. He does not even suspect their existence. If they overwhelm him, he blames it on tough luck, never on his ignorance.

Ordinarily, there are three fundamental requirements in order to expect success in any business, and they are character, capital and capacity. Nearly every electrical supply jobber has only to review the list of contractor-dealer mortalities on his own books to be reminded that, in his eagerness for volume, he has at times overlooked cold economics—all three C's of credit taking have not been strictly observed and the fabric of the industry has been weakened.

The electrical supply jobber, who exchanges credit with a workman whom he knows to be ignorant of the fundamentals of doing business and who is not fitted to give a good accounting of the use of the materials he wishes to buy, is doing his regular customers an injustice and indirectly impairing his own financial standing.

Terms of sale as a part of credit exchange, touching both net and discount maturity, are for buyer and seller

alike binding and mutual. No business gentleman in the performance of his agreement should seek small or petty advantages. The bane of nearly every electrical supply jobber are those financially-sound customers who are able to pay but negligently defer doing so, and unfortunately require considerable urging.

In exchange of credit, there is a promise expressed or implied to give for immediate value received the equivalent at some ascertained time in the future. The terms of sale and discount are a contract that should be lived up to strictly. Should unforseen disabilities occur for reasons beyond the debtor's control, it is not proper for him to extend the terms arbitrarily or refuse to compensate his creditors for the accommodation. Interest at the legal rate should be allowed for the extended time and refusal to allow intrest for the accommodation violates the sanctity of credit confidence.

Insolvency

When a debtor becomes insolvent, there should never be any adjustment that is not for the intrest of all the creditors and for the good of the industry as a whole. The healthy expansion of the electrical jobbing business, with due regard to the preservation of its stability and healthfulness, demands exact honesty in all of the methods and practices upon which it is founded.

The foundation principle of association structure—co-operation—should dominate and control whenever the tranquillity of the jobber's relations with the contractor-dealer is threatened.

The control of any lesser principle produces waste, diffusion of effort and a sacrifice of interests, material and moral, with a separation of jobber and his customer that is offensive to the best laws of strict business procedure. Co-operation and unity save, construct and prevent. Therefore, individual action pursued, regardless of other interest in insolvency, whether secretly or openly, by either jobber or customer is unfair and unethical.

When the administration of an insolvent estate is undertaken by the creditors through friendly instrumentalities or when after critical investigation, creditors representing a large majority of the indebtedness advise the acceptance of a compromise as representing a fair and just distribution of a debtor's assets, it is unco-operative for any one creditor to refuse the friendly instrument or the compromise arbitrarily and force others into a form of administration that will be prejudicial and expensive to the interest of every one concerned.

Worthwhile relations between the electrical supply jobber and the contractor-dealer as groups cannot be brought about until the electrical supply jobber adopts methods to prevent the high cost of ignorance, incompetence and failures that burden every wiring job.

The Electragists look to the electrical supply jobber for some initiative in the exigency. If the electrical supply jobber, the jobber as the more experienced of the weak link between the contractor-dealer and electrical supply jobber, the jobber as the more expeienced of the two groups should take immediate steps to weld it stronger.

I believe the Electragists realize that they have no right to expect an improved situation unless they ally themselves with the legitimate and established electrical supply jobbers, who are interested in their problems for the the good of the industry as a whole. If the electrical supply jobber is to act in the capacity of and with the conservatism of a banker, it follows that he should receive the loyal, continuous support and complete confidence of the organized contractor-dealer.

Low Wattage vs. High Wattage Water Heaters

By Millard Sebern
A. & F. Sales Corporation, Portland, Oregon.

I PRESUME you will be glad to have comments on the article of H. K. Griffin on "Water Heater Load Characteristics," which appeared in the October 1, 1927, issue of ELECTRICAL WEST. I make such comments as are herewith appended only with the thought of being helpful if possible in arriving at the proper solution of the water heating question. My comments will deal only with a comparison of the desirability of high wattage, intermittently operated heaters as against low wattage, continuously operated storage systems.

For comparison let us take the ten high wattage heaters covered in Mr. Griffin's survey as against ten 750-watt heaters operated continuously on storage systems. It has been proved that with proper tank insulation 90 per cent of the homes can receive adequate hot water service with a 750-watt heater or smaller.

There are on the Pacific Coast probably 75,000 low wattage storage systems in use, which proves that they are entirely satisfactory from the customer's viewpoint. From the service company's viewpoint they are one of the large factors in increasing range sales, since the lowest rate is not given unless the customer uses an electric range.

Following is the comparison arranged in parallel:

HIGH WATTAGE HEATERS	LOW WATTAGE HEATERS
Generating, transformer and copper capacity necessary to take care of 10 high wattage heaters..17 kw. The chart at the bottom of page 217 (Electrical West, Oct. 1) would indicate that the probable monthly consumption for 10 high wattage heaters would be approximately 1,970 kw-hr.	Generating, transformer and copper capacity necessary to take care of 10 low wattage heaters..7.5 kw. Monthly revenue from 10 750-watt heaters on the so-called flat rate service at $2.65 each per month.
1,970 kw-hr. at 2c.....$39.40	Ten heaters at $2.65.....$26.50
Note: Only a limited number of customers can afford electric water heating on a 2-cent rate.	(Ed. Note)—Monthly consumption of these heaters, if switched against the range, would approximate 4,500 kw-hr., which at the rate stated would yield a revenue of 0.59c per kw-hr. This note is added to bring out additional points of comparison.
Yearly Revenue:	**Yearly Revenue:**
12 x 39.40 or $472.80.	12 x 26.50 or $318.
Investment of generating, transformer and copper capacity for 17-kw. demand at $300 per kw.....$5,100 (The above may be too high or too low but will serve for comparative purposes.)	Investment of generating, transformer and copper capacity for 7.5-kw. demand at $300 per kw.....$2,250
An investment of $5,100 with a yearly revenue of $472.80 will produce a return of..... 9.2%	An investment of $2,250 with a yearly revenue of $318 will produce a return of.....14.1%
What will probably be the return to the utility for lights, appliances, range and water heater?	What will probably be the return to the utility for lights, appliances, range and water heater?
Range, Lights and Appliances $5.00	Range, Lights and Appliances $5.00
High demand Water Heater.. 3.78	Low demand Water Heater.. 2.65
Total monthly bill.....$8.78	Total monthly bill.....$7.65
Per year for ten accounts $1,053.60	Per year for ten accounts....$918
Investment in generating, transformer and copper capacity for 17-kw. demand 17 x $300 or $5,100.	Investment for generating, transformer and copper capacity for 10-kw. range demand 10 x $300 or $3,000.
For comparative purposes, only the water heater demand is considered. In actual use the accumulated demand of range and water heater should be considered since the customer will not have a satisfactory water heater service if the water heater is switched against the range unless a storage system is used.	(See N.E.L.A. Publication 25-41, June 16, 1925.) For range demand, water heater and range peak will not be accumulated since when a storage system is used the water heater may be switched against the range.
Total yearly revenue of $1,053 on an investment of $5,100 would produce a return of.....20.6%	Total yearly revenue of $918 on an investment of $3,000 would produce a return of.....30.6%

Selling Electric Water Heaters

By H. H. Daley

Sales Manager, Majestic Electric Appliance Company, San Francisco

THERE is no question but that electric water heating may be accomplished economically where low current rates are in effect, but the industry often is faced with the argument that although this system is most desirable because of its convenience, safety and cleanliness, it is frequently expensive, which sets up sales resistance.

Manufacturers are giving a lot of thought to equipment in an endeavor to make it the best, yet little attempt is made to meet this one objection from other than the standpoint of increasing the efficiency of the equipment itself.

Of course, manufacturers will all continue to meet high operating costs by more efficient devices, but how about educating the user by proving to him that old methods are too costly, are out of date, and dangerous?

Bathtubs are out of date and should never be installed for public use, as they are insanitary, too hard to keep clean, take too much time to fill, and require too much space. If you question the first statement, just ask your family physician, and the second may be answered by either the housemaid or the hotel maid, or some member of the family who has to do this work. It takes a long time to rinse a bathtub and fill it with water of the right temperature. Also, in these days space is too valuable, especially in apartments and hotels, to consider bathtubs. Those using bathtubs are usually most extravagant with water, due to their not actually using the water at the time it is flowing in, and therefore they allow the tubs to become too full or to overflow with water that is either too hot or too cold. This means a waste of water, as it must be brought to the proper temperature by adding more hot or cold water.

Now, with showers, the bathers usually are actually using the water while it is running; therefore they have it at the proper temperature and always turn it off when finished. By actual measurement, a shower takes less than one-third the amount of water that is used in taking a tub bath.

Mention should be made regarding how much more sanitary showers are than tubs, even at home, as unclean water is immediately carried away in the shower, which is not so with tub baths.

With this idea properly presented to the customer, the industry has done him a good turn and has lessened the cost of water heating service; besides, it has gone a long way in meeting the argument advanced in the first part of this article, namely, high costs. The cost of water, the cost of heating water, and the maintenance of the baths are all subjects that need consideration, as they figure in the monthly budget and must be of interest to the architects, builders and owners.

Motorized Equipment Increases Efficiency

MOBILITY resulting from motorization of various types of equipment is doing much to increase the efficiency of construction and maintenance forces. The accompanying illustration shows one of the truck-mounted compressor units used by the Pacific Gas and Electric Company for concrete and pavement breaking. Two 50-ft. lines of air hose are carried on reels mounted under the body of the truck. With this equipment two men can break an average of 300 ft. of pavement per day.

Engineering Practice

Radio-Frequency Equipment Used for Remote Control

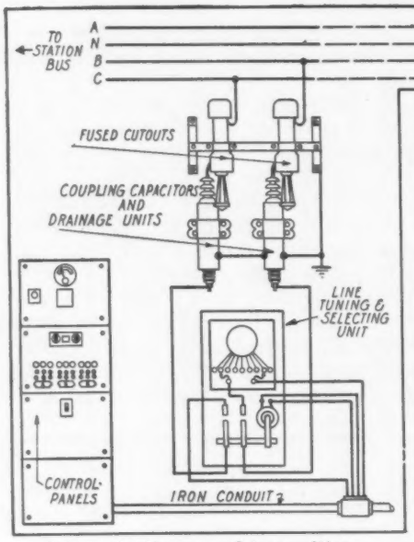
Street Lighting Circuits Fed from Distribution Feeders at Points Remote from Substation Now Under Direct Control of Station Operator

REMOTE control of street-lighting circuits by means of radio frequency current superimposed upon the distribution conductors has been adopted by the Pacific Gas and Electric Company in San Francisco. A vacuum tube radio transmission device installed in Station "F" and subject to the control of the operator is used to send impulses out over the 4-wire feeder circuits to operate the necessary contactors and control devices at remote locations where street-lighting circuits are supplied from those distribution feeders.

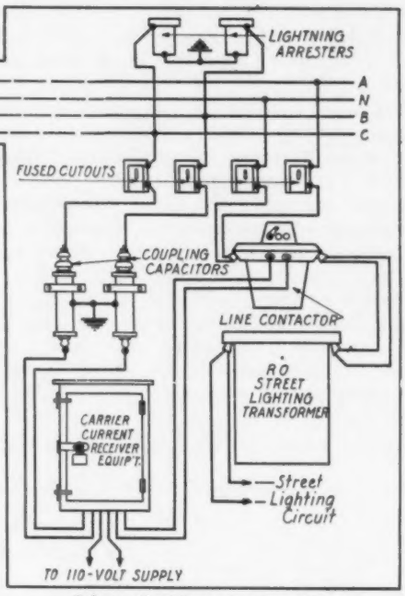
With this new apparatus, remotely located automatic time switches and other control devices are done away with and control is brought back to the substation and placed in the hands of the operator. Thereby the flexibility and control of street-lighting service is materially increased and still no additional conductors are necessitated on crowded poles or in congested underground duct lines and only a very small floor space is required in the substation itself. Development of pole-type and subway-type automatic constant current transformers has made possible the extension of street light circuits previously impossible or at least quite unfeasible. Now, the adaption of the radio tube to the control of this and other equipment is an important if not a final step in extending adequate service to far outlying districts while still retaining control at existing distribution centers.

Among the various methods of control that have been or are being used are manual control, frequency variation, intermittent superposition of frequencies ranging from 200 to 1,000 cycles, time switches, cascading and pilot wires. Most of this effort has been directed toward placing the control in the hands of a substation operator and in some way utilizing the existing power wires for conveying the control impulses from the substation to the lighting circuit control equipment. In view of recent developments and operating experiences with new equipment the use of control energy at moderately high frequencies seems to offer some distinct advantages over the other methods of control. Briefly, the advantages that are claimed for carrier current control are:

1. The use of existing circuits for transmission of controlled energy;
2. Normal distribution of current is not affected in any way;
3. Interference with telephone circuits and space radio is avoided;
4. Control is equally applicable to either grounded or ungrounded distribution systems;
5. Control equipment cannot be operated by lightning, switching surges or stray currents;
6. The "on" and "off" operations are so distinctive that there can be no question as to the condition of the circuit at the remote point;
7. A temporary interruption of power does not affect the condition of the controlled circuits.



Schematic diagram of transmitter.



Schematic diagram of receiver.

Transmitting Equipment

Only one transmitter is required for each substation from which carrier control is required, and it serves selectively all circuits to be controlled. The substation equipment really is divided into two parts, the first being the high frequency generator, or oscillating circuit, and the transmitting control equipment, and the second being the line tuning and coupling equipment. The former equipment is mounted on a standard 28 x 76-in. panel which may be placed anywhere in the substation that is convenient from an operating standpoint.

The tuning and coupling equipment is located where it is convenient to make the necessary connection to the distribution feeder and to arrange a protecting compartment, as this part of the equipment itself is rather exposed and operates at line potentials. The transmitting equipment is built around two 50-watt vacuum tubes together with the transformer and necessary control switches and receives its energy direct from the station a.c. supply. The apparatus mounted on the front of the panel is all at low potential and consists only of the output ammeter, the control keys, the power supply switch, the feeder selection receptacles and the indicating lamps. A plug receptacle is provided for each circuit to be controlled and has adjacent to it a red and a green signaling lamp which give a continuous indication of the condition of the remote automatically controlled apparatus. Transmitter frequency may be arranged for from 35 to 45 kilocycles, a range that will not interfere with telephone or radio.

The line tuning and selecting unit, together with the coupling capacitors and protective equipment constitute the second half of the substation equipment. The tuning unit is mounted as close as posible to the line coupling capacitors and is arranged to tune the line and coupling capacitors to the transmitter frequency. This tuning equipment is adjusted when it is installed and no fur-

ther adjustment is necessary. The contactor element serves to connect the transmitter to any particular feeder when a control impulse is to be transmitted over that feeder. One of these tuning and selecting units is required at the transmitter end for each circuit over which carrier control is desired. A carrier circuit constitutes two wires of an outgoing feeder.

Connection from the tuning and selecting unit to the conductors of the feeder circuit is accomplished through condensers, or coupling capacitors. Each capacitor has a drainage coil included in its case that is designed for a very low impedance at 60 cycles and which serves efficiently as a drain for static charges and as a barrier against the passage of low-frequency power current into the equipment, but which has a very high impedance at carrier frequencies and hence does not form a ground connection for the carrier frequency. One combined coupling and drainage unit is required for each line wire used for carrier impulse transmission. Additional protection is provided in the form of lightning arresters and a suitable 5-amp. fuse cutout in each connection to a line wire. Lightning arresters may be used where conditions require. Transmitting equipment always is connected to the outgoing feeders directly at the cable pothead in order that the carrier equipment will be on the line side of the voltage regulator and always will be connected to the feeder regardless of bus switching arrangements.

Another interesting feature is that the connection between the oscillating circuit of the transmitter panel and the tuning and selector equipment at the cable potheads is made by means of rubber-covered wires strung in ordinary iron conduit.

Receiver Equipment

Receiving equipment, unlike the usual radio receiver, is adjusted permanently to respond to the predetermined wave length. The receiver box is mounted on a pole at the point where it is desired to effect control of the street-light circuits, and contains a vacuum tube receiver, relays, transformers and associated equipment. The receiving equipment is coupled to the same two phase wires as is the transmitter equipment and like the transmitter equipment is protected by suitable 5-amp. cutouts. The receiver circuit uses a single vacuum tube which is operated at a reduced rating and which has a normal expected life of at least one year. The circuit used is simple and requires no field tuning or adjustment. The receiver unit is detachable from the panel in the receiver box and may be removed without disturbing the box or any of the external wiring.

To care for an emergency, means are provided for operating the lights by hand. Also the receiver equipment may be made inoperative to protect any who may be working on the circuits.

Where additional protection for the receiving equipment as a whole is provided by means of lightning arresters, they are attached to the phases of the distribution circuits to which the carrier equipment is coupled. To avoid draining the carrier energy to ground a series-gap type of lightning arrester must be used.

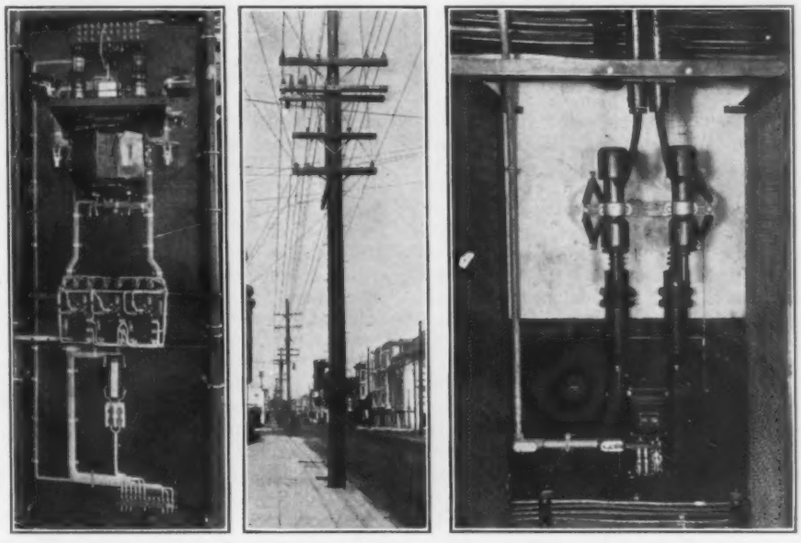
The carrier-current control receiver equipment is coupled to the line wires by means of coupling capacitors and drainage units similar to those used at the transmitting end in the substation. From the relay-controlled contactor in the receiver cabinet the main operating leads are carried to the main contactor which in turn controls directly the street-lighting transformer.

Operation

Referring to the accompanying schematic wiring diagram, the method of operation of the equipment may be traced through. When it is desired to operate the carrier control the operator inserts the potential plug in the receptacle corresponding to the feeder which he desires to control. Thus, if it is feeder No. 61 which the operator desires to control, he will insert the plug in receptacle No. 61 and this will complete the necessary preliminary circuit to connect the transmitting equipment to feeder No. 61. Then if the lights are to be turned on, the main control switch marked "On" is operated, which in turn starts up the transmitter and causes the correct signal to go out over the two wires of feeder 61. This operation also energizes the red lamp on the operating panel which indicates continuously thereafter (until a subsequent operation) that the last operation performed was to energize that particular circuit. At the end of the signal impulse the tranmitter automatically shuts down and is ready for succeeding operations.

Control impulses from the transmitting equipment pass out through the tuning and coupling equipment onto the selected phases of the distribution circuit and travel over those line conductors out to where the various associated installations of receiving equipment may be made. At the receiver end the carrier impulse operates, through the receiving circuit, to energize an induction type time-delay relay. The timing relay controls a small contactor which handles the operating current of the main contactor located in the primary lead of the street-lighting transformer.

The induction-type timing relay serves to prevent the operation of the control equipment in the event of transient high-frequency disturbances incident to lightning, switching surges or other disturbances. Also this relay serves to distinguish between the "on" and "off" carrier impulses, thus assuring accurate control of the street-lighting circuit itself. A 5-sec. impulse causes the induction relay to operate so as to close the auxiliary contactor and thus energize the closing coil on the main oil contactor in the street-light circuit. An impulse of 10 sec. duration causes the induction relay to operate so as to reverse this procedure and extinguish the street lights. The position of the auxiliary contactor is not affected by interruptions or variations in line voltage and thus in the event of an interruption to service on that particular line a normal condition is re-established immediately upon return of line voltage. The receiving equipment takes its power from a convenient secondary circuit and thus no batteries are required.



Left—rear of control panel showing signal equipment. Center—a receiving unit. Right—line tuning, selector and coupling equipment.

The Pacific Gas and Electric Company is the first electric service company in the West to install this radio-frequency type of remote control. At present the equipment is operating on one feeder circuit although as installed it is arranged to handle three feeders. Additional installations are contemplated for the future.

Indoor-Type Distribution Substations Serve Portland Residential Areas

By F. M. Lewis, Engineering Department, Northwestern Electric Company, Portland, Oregon.

IN common with other electric utilities the Northwestern Electric Company of Portland, Ore., is faced with the problems incident to the placing of substations in residential areas. One of the latest stations completed by that company is the Weidler substation, various illustrations of which are shown herewith.

Previously the company had built several of the open-air type of distribution substations, but the Weidler station is a complete departure from this, entirely indoors. No attempt was made to give the building the appearance of a residence, but very careful consideration was given to the architecturtal treatment of the structure to the end that it present a dignified and pleasing appearance that would make it a really valuable addition to a residential neighborhood. As shown in Fig. 2, the ground about this station is practically level, therefore the landscaping was limited to a well-kept lawn and thoughtfully placed shrubbery. A permanent sprinkler system simplifies the irrigation of the premises and a public drinking fountain placed at the intersection of the sidewalks of the adjoining streets affords at once an ornament and a public convenience.

Full advantage of the advertising value of flood lighting is taken through the installation of seven 300-watt floodlighting units so placed as to avoid all glare and yet to bring out the architectural attractiveness of the building and its surroundings. Each of these flood lamps is mounted at ground level and completely screened from the street side by groups of shrubbery. This arrangement makes more effective the night-time illumination and also serves to keep the floodlights out of sight during the daytime. Floodlights are automatically controlled by means of a time switch.

An indicated in accompanying illustrations, the building is laid out on one floor and is so arranged that its physical size may be doubled when load requirements necessitate, using the same design specifications and general arrangement by merely reversing the floor plan. The present station accommodates one 11-kv. supply line and three 2.4-kv. distribution feeders. The main transformer bank consists of three 1,000-kva., 11/2.4 kv. units connected delta-delta. At present each of the feeders is controlled by two induction regulators connected open delta. All of the incoming and outgoing lines enter and leave the building through 3-conductor underground cables terminating at nearby poles.

Fig. 2. Exterior of Weidler substation, Northwestern Electric Company, Portland, Ore. Shrubbery hides floodlights. Doors along the side give access to the regulator cells.

As may be noted from Fig. 4, the transformers are located along one side of the building, each transformer in a separate and completely enclosed concrete cell, entry to which may be made only from the exterior of the building. Along the opposite side of the building, parallel to the transformers, are arranged the cells accommodating the regulators for each of the outgoing feeder circuits. Here the regulators for each feeder also are in completely enclosed concrete cells which may be entered only from the exterior of the building. It may be noted from Fig. 5 that no barriers are provided between regulator units within the cells.

Along the center of the building between the transformers and the regulators is the control and switch room. In this room the switchboard is mounted, its back toward the transformer cells and its face toward the regulators. The general arrangement may be noted from Figs. 3 and 4. The 11-kv. bus and oil switch are mounted in a vertical concrete structure in the central room of the building. Details of this arrangement may be obtained by referring to Figs. 1, 3 and 4. The 11-kv. switch is housed in a cell by itself with its disconnecting switches in separate cells as shown. This oil switch is arranged with a 3-pole, gang-operated bypass switch through the use of which the oil switch may be cut out without interruption to service. The 11-kv. oil circuit breaker is manually operated for closing but is controlled by three induction-type overload relays for emergency opening. Future provisions already are made for a second

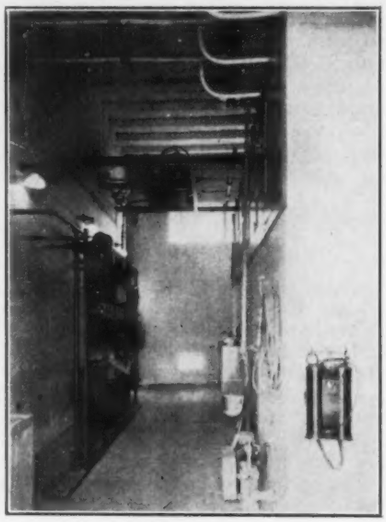


Fig. 3. Control and switch room, Weidler substation.

11-kv. incoming line and when that installation is made the 11-kv. switches will be fitted for electric operation and equipment will be installed that will provide automatic selectivity between the two incoming lines.

Each of the outgoing feeders is fitted with automatic reclosing equipment to take care of momentary interruptions, the equipment locking out after two reclosures. The feeder oil switches and disconnecting switches are mounted in separate cells in the bus structure in

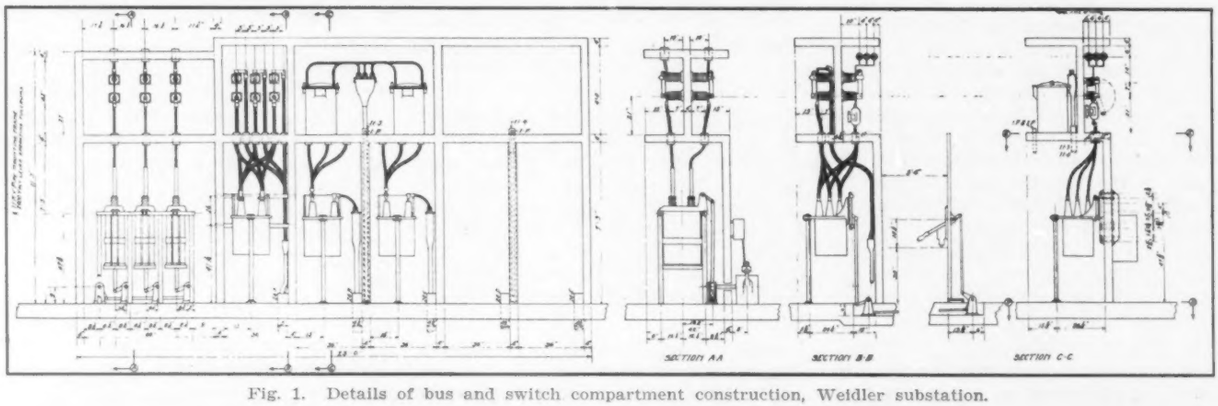


Fig. 1. Details of bus and switch compartment construction, Weidler substation.

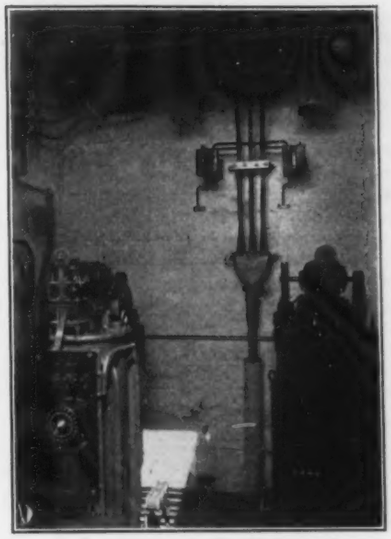


Fig. 5. Typical regulator cell, Weidler substation.

the control room. All of the cells are equipped with fireproof doors. Provision in the present installation has been made for a fourth outgoing feeder, for a third regulator for each feeder when load conditions require, and also for changing the voltage to 4.1 kv. Y when load conditions may require.

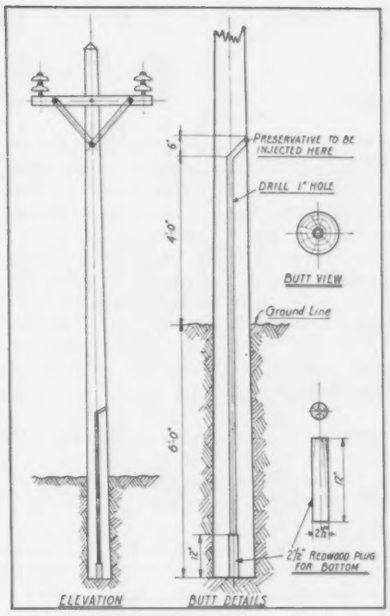
By transferring the load of any feeder to the emergency bus the feeder oil switch or regulator equipment can be cut out without service interruption. For this transferring of feeder load to the emergency bus, subway type oil switches are used. These switches are located in the regulator cells, but are controlled manually from the control room. They may be seen near the top of Fig. 5. The emergency bus has the capacity necessary to carry the load of all four feeders and it is, itself, protected by an oil circuit breaker and induction overload relay.

The station is completely unattended except for maintenance work. An automatic signal system has been rigged up which works in conjunction with the company's private telephone exchange through the operation of which a code of signals is transmitted to the telephone operator in the company's exchange advising her of any unusual conditions that may develop at the station. The telephone operator can transfer the call to the proper party who, by the further operation of the automatic signal system, can obtain a complete check of the condition of the station equipment, including the open or closed position of all oil circuit breakers and a signal advising whether or not the 2.4-kv. bus is energized. The signal continues to operate for 15 min. and then will reset itself if all feeders have normal voltage, otherwise the apparatus will continue to operate.

Internal Butt-Treating of Poles Suggested in Scheme

A suggested method for additional butt treating of wood poles is shown in the accompanying illustration. With this scheme the poles should be prepared in the yard and externally butt-treated in the usual manner. After the pole has been set into the ground the 10-ft. hole that has been bored into the butt of the pole is to be filled with preservative compound and the upper hole plugged to keep out dirt and insects.

The intention is that presevative compound from this internal reservoir will permeate the wood fibre causing the pole to last much longer than would be the case if only externally treated. Also, the reservoir may be refilled from time to time by an inspection crew.



Details of pole-treating scheme.

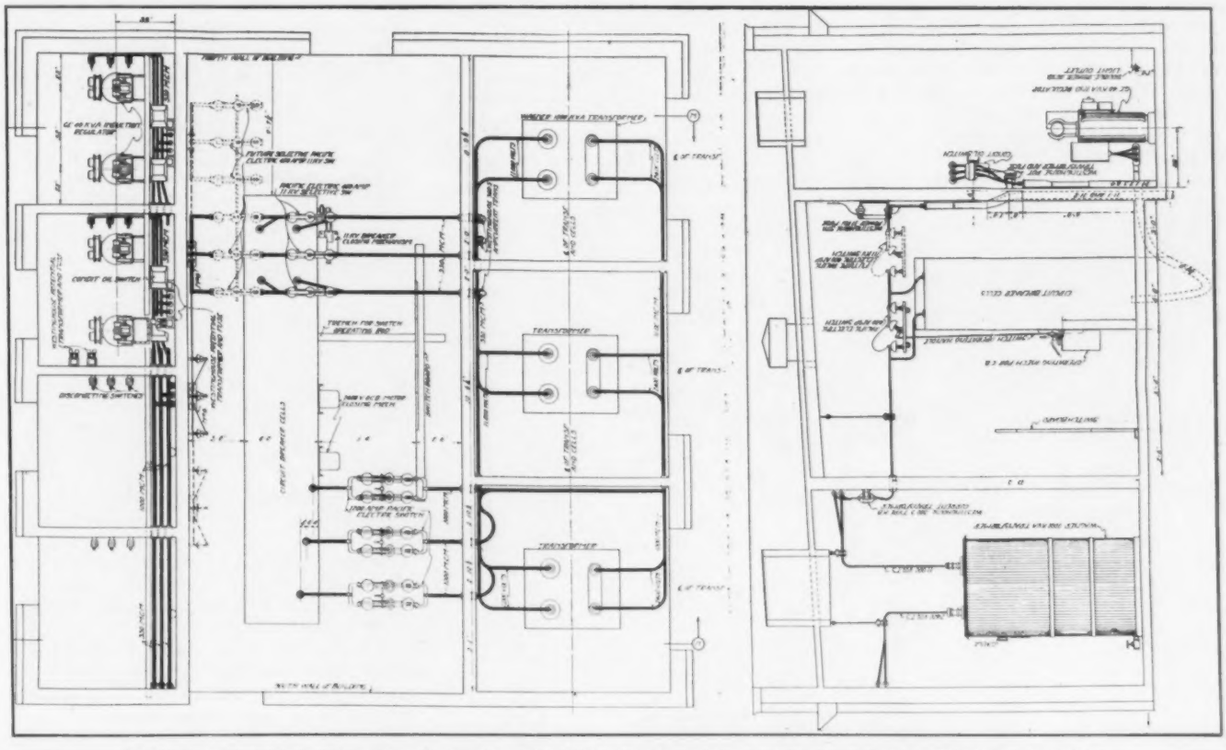


Fig. 4. Floor plan and sectional elevation (right), showing equipment arrangement at Weidler substation.

Analysis of Current Transformer Tests—VIII

Test Results on Series "Misconnections"

By E. C. GOODALE, Tacoma, Washington

FOLLOWING are two of the test results on series-connected secondaries. In the first case, Fig. 27, the two currents transformers were connected, with both primaries and secondaries in series. The same current therefore flows through both primaries, and, having the same ratio their nomal secondary currents are the same and there are no conflicting differences with which to over-magnetize the cores. Hence no high voltages are built up and the currents, divided by the ratio. (See Part VII.)

The circuit shown in Fig. 28 might result from misconnecting Fig. 27. In Fig. 28 one of the transformers is reversed so that they apparently are bucking each other. The common current in this case should be the vector average difference of the primaries, divided by the ratio. Since the primary currents are the same this will be ½ (zero) or zero. In other words, no secondary current will flow and all the primary current goes to magnetize the core. The effect is exactly the same as open-circuiting the secondary. This was checked by actual test at the time of taking the data and exactly the same values were registered.

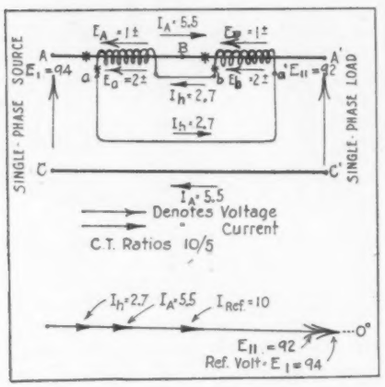


Fig. 27. Both primaries and secondaries in series.

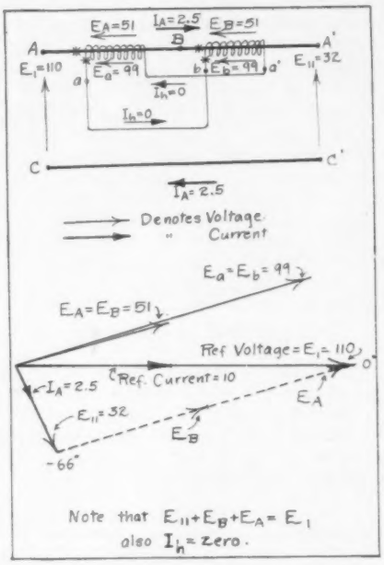


Fig. 28. Primaries in series, secondaries in parallel.

The load consisted of two 250-watt lamps in parallel across the line. For Fig. 27 the reference voltage was $E_1 = 94$ volts and the reference current $I = 10$ amp. in phase with E_1 drawn by a separate load across E_1. For Fig. 28 the reference voltage was $E_1 = 110$ volts and again the reference current I was 10 amp. in phase with E_1. Phase relations were determined with mattmeter, voltmeter, ammeter, variable autotransformer and induction coil as explained in detail in Articles II and III in the March and April, 1927, issues of Electrical West.

Tables V and VI show the test data for Figs. 27 and 28, respectively.

In succeeding articles further examples of series mis-connections will be taken up and analyzed.

EDITOR'S NOTE: This is the eighth of a series of articles built around actual tests of various instrument transformer connection as made by the author in the meter testing laboratory of the Syracuse Lighting Company, Syracuse, N. Y. The next article will deal further with "misconnections."

Table V.—Test Data.

	Volts or Amp.		Watts-Switch Down		Cosine of Angle	Angle (Deg.)	Registration-Switch Up	Lag or Lead
E_1	94	+	940	+	1.0	0	Very slight change	In phase
E_A	Negli.	+	15		....	....		
E_B	Negli.	+	15		....	....		
E_{11}	92	+	920	+	1.0	....	Very slight change	In phase
E_a	Negli.	+	20		....	....		
E_b	Negli.	+	20		....	....		
I_A	5.5	+	520	+	1.0	0	Very slight change	In phase
I_h	2.7	+	255	+	1.0	0	Very slight change	In phase

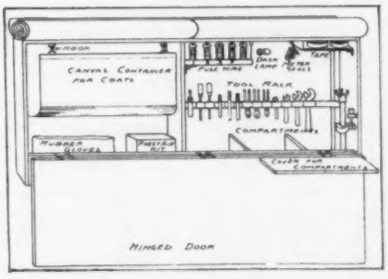
Table VI—Test Data

	Volts or Amp.		Watts-Switch Down		Cosine of Angle	Angle (Deg.)	Registration-Switch Up	Lag or Lead
E_1	110	+	1,100	+	1.0	0	Very slight change	In phase
E_A	51	+	490	+	0.965	15	Increased Pos.	Lead
E_B	51	+	490	+	0.965	15	Increased Pos.	Lead
E_{11}	32	+	130	+	0.407	66	Decreased Pos.	Lag
E_a	99	+	950	+	0.96	16	Increased Pos.	Lead
E_b	99	+	950	+	0.96	16	Increased Pos.	Lead
I_A	5.5	+	110	+	0.40	66	Increased Pos.	Lag
I_h	0		0		.....	....		.....

Special Tool Box Aids District Truck in Double Duty

By L. L. PERRY, Pacific Power & Light Company, White Bluffs, Wash.*

In a small district where there is only one car, it is necessary to have that one car equipped for service as well as for line work and this double duty requires that a large and varied assortment of tools be carried. In the accompanying illustration is shown a schematic diagram of a tool box that has been used to good advantage in the White Bluffs district. The box illustrated is mounted upon the side of a commercial-type truck. In it are carried wrenches of several different sizes, a fuse hook, meter seals, a meter sealer, pliers, copper connectors, screw drivers, a drill, friction tape, fuse wire of various sizes, a first-aid kit and a set of rubber gloves. Also there is provided a canvas container for extra coats and sweaters.



Compartment tool box for mounting on commercial-type truck body.

As indicated, the box is divided into two general compartments, one of which contains tools and the other of which contains the rubber gloves, the first-aid kit and coat container. The first-aid kit in this prominent position makes it extremely handy and immediately available and at the same time its presence in plain sight is a continual warning to work safely. The scheme of carrying extra coats and sweaters in a clean place has saved the truck crew many a cold night's ride home from work when caught in an unexpected storm.

* From Pacific Power & Light Company Bulletin.

In the right hand compartment of the tool box the general arrangement may be noted but a few special arrangements warrant special mention.

Five spools of fuse wire of different ratings are mounted on thimbles on a hinged shelf that is held in its normal position by an ordinary screen door hook fastened to the top of the tool cabinet. This arrangement of the fuse wire makes it immediately available because spools are free to turn and the shelf arrangement greatly facilitates the replacement of empty spools. In addition, the carrying capacity of each size of fuse wire is stenciled on the shelf immediately opposite the spindle. A similar spindle shelf is provided at the right for the tape rolls.

The lower portion of the right hand half of the tool box is divided into smaller compartments for carrying nails, screws, copper connectors and such small material, each in its proper compartment. A separate cover for these small compartments is provided to keep the small pieces in their proper compartments in spite of bouncing incident to rough roads. This compartment cover is mounted on the main tool box door in such a position that when the main door is closed the compartment door is closed also and vice versa. This arrangement makes the small equipment in the special compartments always available immediately when the main tool box is open and also provides that the compartments will be tightly covered when the main door is closed. Large tools such as hammers, axes, bolt cutters, etc., are carried in another box on the opposite side of truck body.

Underground Construction in Congested Areas

Standards Adopted by Southern California Edison Company Consider Importance of Accessibility and Ventilation

By CLAYTON BIGGS, Superintendent of Underground Construction, Southern California Edison Company, Los Angeles

A GREAT deal of attention and study must be given to a proposed downtown underground system. This study must include a careful check of all of the streets and alleys to locate all other utilities or city water or sewer lines; the construction of a tentative working plan locating all existing overhead transformer installation and noting the load fed therefrom; and the tentative location of proposed underground transformer vaults as nearly as possible at existing or developing load centers.

One feature that has been proved definitely by operating experience is the fact that no transformer vaults should be located in alleys because an open vault in the usual 10 or 20-ft. alley will block traffic completely. Further, and even of more importance, is the fact that in case of fire in a city block a vault located in an alley is certain to be made inaccessible by the fire. It is particularly essential that all plans be carefully rechecked prior to the starting of actual work in order to ascertain that nothing has been overlooked that ultimately might cause a change in location of any part of the underground structure after construction once has been started. Such changes are extremely expensive.

A few of the more common standard underground practices of the Southern California Edison Company will be touched upon briefly. Manhole sizes in common use vary from a minimum of 4 x 5 x 7 ft. to a normal maximum of 6 x 6 x 8 ft. Transformer vaults are larger, varying from 6x12x8 ft. to as much as 10x20x9 ft. 4 in. according to load requirements and the voltage of the cables to be installed. For primary feeder circuits 3-conductor, paper-and-lead-covered, 5-kv. cable is used varying in conductor size from No. 2 to 300,000 circ.mil. Sizes most commonly used are 2/0, 4/0 and 300,000 circ.mil operating at 4-kv. 4-wire grounded neutral. In most cases the neutral is common to both primary and secondary. Secondary cables are single-conductor, 1.5-kv., lead-and-paper-insulated, 6-wire secondary mains utilizing proper sizes varying from No. 2 to 4/0 for power and from 2/0 to 500,000 circ.mil for lighting service. Cables for 11 and 15-kv. service are 2/0, 4/0 and 350,000 circ.mil lead-and-paper-insulated with voltage ratings of 13.5 kv. and 21 kv., respectively. All 4, 11 and 15-kv. cables are fireproofed in manholes using the Johns-Manville system and material.

Transformer vaults usually are vented by one 8-in. tile line extending from each end of the vault to the adjacent curb where connection is made with a standard vent casting flush with the sidewalk. To facilitate air circulation and ventilation where excessive heating occurs a ¼-hp., 220-volt, 3-phase, specially-wound motor direct connected to a Sirocco-type blower is mounted at the entrance of one of these tile duct lines to draw air into the vault. This fan is mounted on a bracket suspended from the ceiling of the vault and discharges in a downward angle stirring up air circulation within the vault and forcing air into the vault which ultimately is discharged through the other tile ventilating line at the opposite end of the vault. This arrangement gives ample ventilation for 6x12-ft. and 8x14-ft. vaults containing transformers of capacities up to 400 kw. Subway-type transformers are used in the larger districts where underground systems are installed. In certain locations it is necessary to waterproof all equipment installed within these vaults.

To facilitate paralleling and sectionalization of primary feeders and also to serve the transformers, Standard Underground junction boxes are used. This box is made up to receive two 3-conductor circuits thus giving the vault a

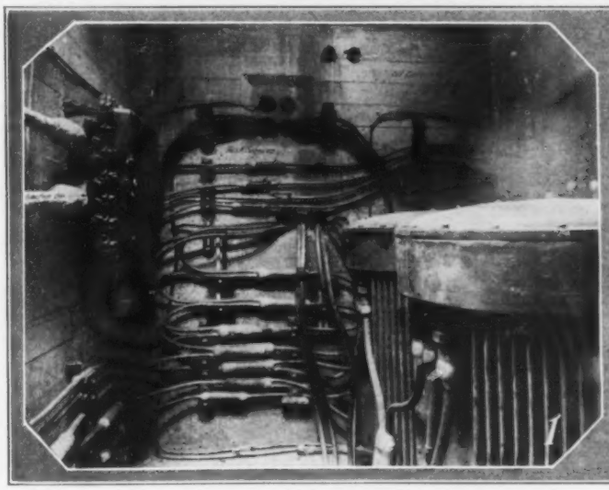


Fig. 1. Typical commercial distribution vault of the Southern California Edison Company showing junction box (left), test sleeves and transformer leads (center) and oil cut-outs (upper right).

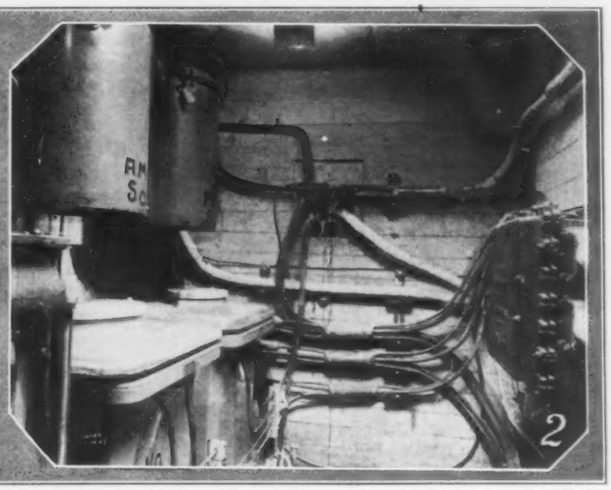


Fig. 2. Street lighting distribution vault showing general arrangement of equipment.

double source of supply. To provide for transformer taps, six single-conductor wiping nipples are provided in the junction box. These single-conductor taps are No. 2 lead-and-paper-insulated 5-kv. cable especially stranded to provide flexibility. To provide control of the transformer banks these leads are connected through D & W subway-type oil cut-outs. The arrangement of this equipment is shown quite clearly in Figs. 1 and 2.

Power and light is supplied to each transformer vault from its distribution transformers. Three-phase service is supplied for the blower motor and three lighting outlets each normally fitted with a 50-watt light provide ample illumination for normal conditions. Lighting circuits are installed in metal conduit cast into the walls of the vault and similar construction is used for blower control where blower has been installed at the time the vault was built. Otherwise it is necessary to run lead-covered control cables for the blower motor. Blower control is effected through an enclosed safety-type switch. For reinforcing the vault ceilings it has been found entirely practicable to use sections of discarded railroad rails. Fig. 3 shows the general design characteristics of a typical transformer vault.

An increasing demand for ornamental street lighting in new districts, for larger units in existing districts and for more circuits in general is demanding the installation of more and larger R O transformers in one given transformer vault. In some isolated locations there has been some trouble due to heating. Initial attempts were made

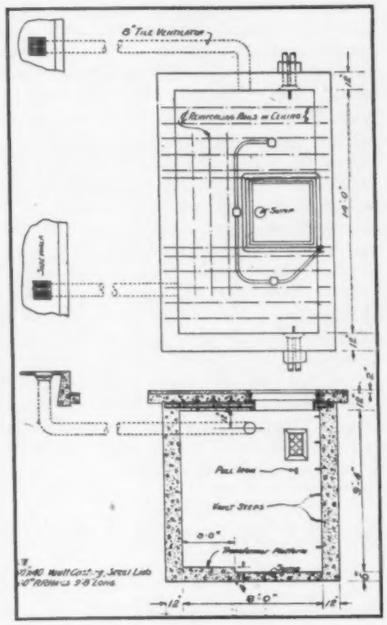


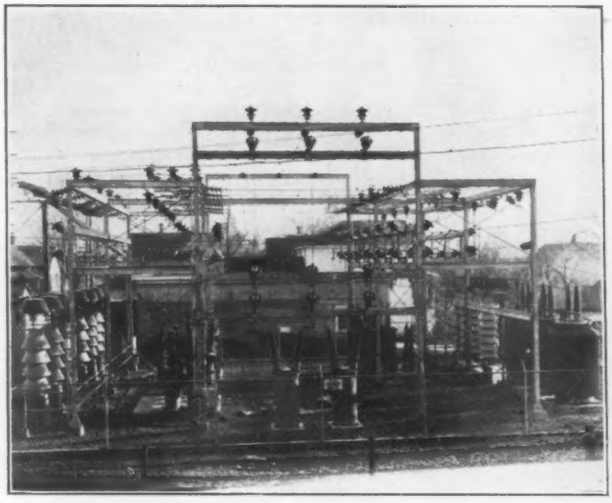
Fig. 3. Schematic plan and sectional elevation of an 8x14x9-ft. transformer vault.

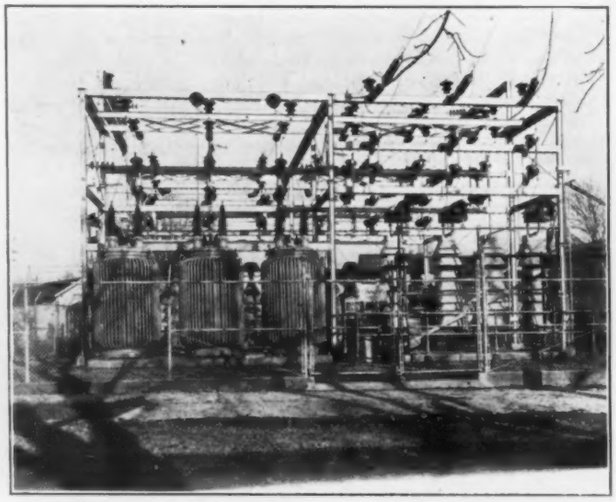
to overcome this difficulty by the installation of single-phase ventilating fans connected to operate only while the primary control circuit controlling the street lights was energized. This arrangement proved to be insufficient because ventilation was shut off as soon as the transformers were disconnected from service thus restricting the cooling of the transformers while they were out of service. This condition has been corrected by bringing 3-phase power in from an outside source and installing standard 3-phase ventilating sets that operate regardless of whether the street lighting transformers are in service or out of service. Two new street-lighting transformer vaults measuring 10x20x9 ft. and designed for a maximum installation of sixteen 15-kw. R O transformers have been completed recently and no trouble at all is expected from heat.

Standard duct-line construction utilizes either 3½ or 4-in. fibre conduit spaced from 1 to 3 in. apart and cast in concrete. Usually one duct run will comprise conduit carrying cables of several different voltages. To facilitate the handling of these different cables at the manholes and vault it is standard practice wherever possible to offset and stagger the manholes so that high-tension and low-tension cables do not enter the same hanhole or vault. Where this type of construction is impossible or unfeasible the duct line is fanned out in a spread beginning about 16 ft. from the manhole and so arranged that the 11 and 15-kv. cables are brought in lower down and clear over to one side of the manhole or vault thus removing them as far as possible from the primary and secondary cable.

Underground construction costs for down-town districts where loads are heavy vary from $8 to $12 per ft. depending upon the class of pavement to be cut and replaced and depending upon whether 11 or 15-kv. cables are to be installed along with the distribution system.

Adding to Oregon's Transmission and Distribution Facilities





In the heart of the Willamette division transmission system of the Mountain States Power Company is this new outdoor switchyard and substation. It is located at Albany, Ore., on property adjacent to the power plant of the company, and replaces old indoor equipment. From this point radiate three 66-kv. circuits: one extending south to Springfield, where connection is made with The California Oregon Power Company; one extending north to West Salem, where a similar connection is made with the Portland Electric Power Company; and one running west to Corvallis, where the concentration of load warrants a high-tension feed.

A bank of three 833-kva., 66/11.5-kv., General Electric transformers supplies local distribution service to Albany and vicinity. The secondary is carried underground into the power plant building across the street, from which radiates the local 11-kv. lines. This building contains both steam and hydro-electric generating equipment, houses the dispatcher's office from which the transmission system of this division is operated, and contains controlling equipment for local distribution.

Under-Water Construction Facilitated by Semi-Cylindrical Steel Caisson

PART of the work incident to the enlargement and reconstruction of Station C of the Pacific Gas and Electric Company at Oakland, Calif., required the placing of a new circulating-water inlet below minimum tide level in Oakland Harbor. A new 37,500-kva. turbine required an addition to the circulating-water system of a 48-in. cast iron pipe laid 23 ft. below the street grade and 20 ft. below high tide level. The penetration of a concrete sea wall some 10 ft. thick and the placing of the inlet section of pipe with a control valve on the land side of the sea wall was the first problem presented.

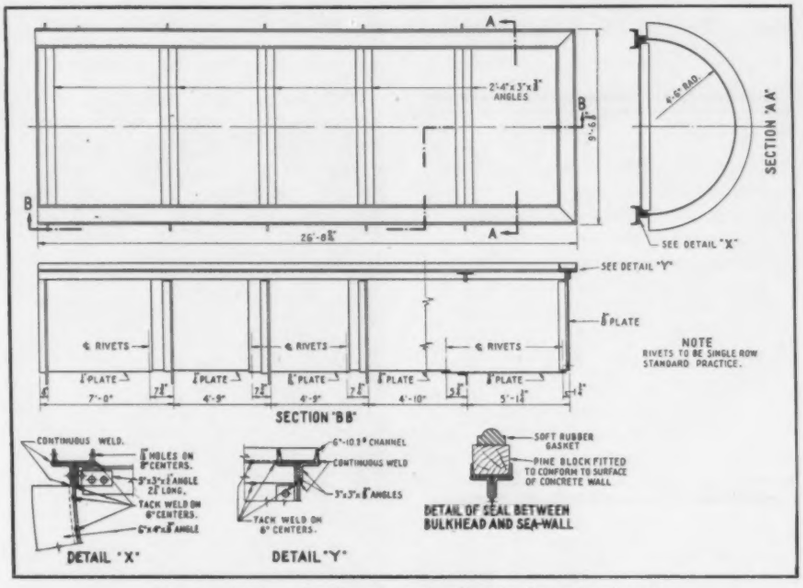


Fig. 1. Design details of semi-cylindrical steel caisson.

The inlet construction involved an appreciable amount of under-water work and comparative cost studies show that to do this work with divers would be entirely too costly. An alternate plan to use a sheet-pile bulkhead was entirely imparticable due to the extremely soft bottom encountered which would have made it almost impossible to establish a satisfactory seal between such a bulkhead and the toe of the sea wall. A wooden bulkhead with a built-in bottom and fitted with a rubber sealing gasket was considered but judged too heavy and difficult to handle.

Steel seemed to be the logical material to use and accordingly a semi-cylindrical section was designed that gave great strength together with comparatively light weight. The details of this are shown in Fig. 1. Design details are given in the illustration, hence no further discussion is necessary except to point out that the semi-cylindrical caisson is strengthened by means of five angle-iron stiffeners welded in place. Also it may be noted that the face of the caisson is fitted with a channel iron welded in place to provide a seat for the seal gasket. To provide for a snug fit against the irregularities of the sea-wall face a 6 x 6-in. timber cut to fit these irregularities was cemented into the channel iron on the caisson by means of hot asphaltum. To provide for the exact marking of this timber facing, a wooden template of the proper dimensions was lowered into the correct position and a diver sent down to scribe upon this template the outline of the sea wall at its point of contact with the caisson. To provide for the ultimate water seal a heavy rubber gasket 4 in. wide and about 1 in. thick on the 4-in. base with a half-round section in the center, bringing the total thickness to 2¼ in., was cemented to the timber facing. The rubber gasket was especially constructed to fit the caisson and the net result was an absolutely water-tight job.

The total weight of the caisson amounted to 4½ tons, which is comparatively light for its size and duty. The handling was entirely by means of truck-mounted cranes as shown in Fig. 2. This provided a highly flexible system of handling.

In the placing of the caisson after it was lowered down over the sea wall,

Fig. 2. Handling caisson with truck-mounted cranes.

the mounting as shown in Fig. 3 gave a hinge action at the top which provided rigidity in a vertical plane, obviating the possibility of damage to the rubber gasket due to wave movement. Initial rigid fastening to the sea wall was accomplished by means of two sets of bolts that had been placed in the sea wall during low-tide periods. These bolts were fastened to the struts across the face of the caisson. As the water was pumped from the inside three more sets of bolts were placed successively and fastened to the steel struts on the face of the cylinder.

Exterior water pressure amounting to 75 tons maximum in combination with the mounting bolts just described compressed the rubber gasket to a thickness of about 1¼ in., completely sealing the joint between the caisson and the sea wall. The upthrust of 26 tons was cared for by the four 1-in. turn-buckle stays shown in Fig. 3 assisted by the 4½-ton weight of the caisson, together with the 16 ¾-in. bolts used for holding the bulkhead to the wall.

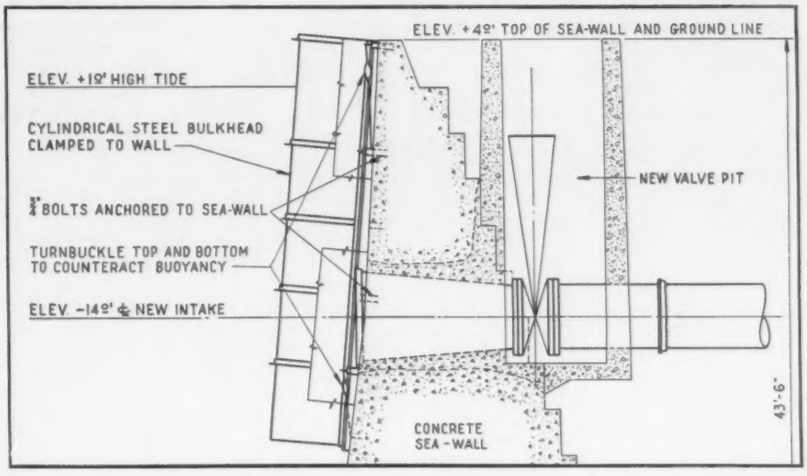

ELEV. +49' TOP OF SEA-WALL AND GROUND LINE
ELEV. +19' HIGH TIDE
CYLINDRICAL STEEL BULKHEAD CLAMPED TO WALL
BOLTS ANCHORED TO SEA-WALL
TURNBUCKLE TOP AND BOTTOM TO COUNTERACT BUOYANCY
ELEV. -14' ℄ NEW INTAKE
NEW VALVE PIT
CONCRETE SEA-WALL
43'-6"

Fig. 3. Application of caisson to sea wall.

Ideas for the Contractor

Contracting "Under a Hat" Has Its Advantages

Portland Firm Operating from an Office Does Contracting Only but Eliminates Overhead and Runs on a Clean Monthly Basis

THE small contractor, with all his faults, has the advantage as a rule of working on a low overhead and on a cash basis. He has not much money invested, because he has not much to invest. A little later, if he is the kind who succeeds, he will broaden out his establishment, he will get himself a headquarters and, in most cases, he will collect a pretty stock of materials to be used in jobs of all descriptions, bought at favorable prices in quantity lots and ready for use now or a year from now. Incidentally, he will have acquired a fund of experience and a working organization which enable him to bid on jobs and to handle them with judgment.

These last two items are essential to the success of any contracting business, but the other accessories of an "establishment" and a capital investment in stock are mere encumbrances, in the opinion of the Jaggar-Sroufe Company of Portland, Ore. The contractor in his early days of doing business "under his hat" had, this company believes, the best of it in this respect.

As a consequence, although the firm ranks among the foremost of the Pacific Northwest and although it did a business of more than a quarter of a million during the yast year, it has handled its work entirely from an office and the permanent employees whose time would be charged as overhead and not applied solely to the job in progress are confined to two persons, besides the members of the firm—a bookkeeper and a storekeeper. Including rent, these items of overhead come to somewhere in the neighborhood of $400 a month. And there are no other items of overhead!

The business has been so organized that it could practically be closed down at the end of each month, with no frozen assets to liquidate and no bills to pay.

The way this has been done is primarily by reducing stock kept on hand to a minimum. Its actual value is perhaps $5,000, consisting largely of wire, which is the one item bought in quantity, of lights and lighting material which are rented out at carnival time and the holiday season to business firms, and of the few unfavorable leftovers from building jobs. These latter items are completely written off the books and charged to profit and loss while the wire and lights are charged at a nominal figure, the total credit given for the stock being not more than $500. In comparison with the $20,000 business handled monthly, this is equivalent to carrying no stock at all. Indeed, the actual volume of the material kept on hand is so small that it is kept in the basement storeroom which goes with the rent of the office headquarters.

By concentrating on construction work and keeping neither store, stock nor—most important—overhead, a contractor can operate a large business on a small capital, collect promptly and let the jobber be his stockkeeper, as a jobber is supposed to be. There is a growing tendency in this direction as more strictly contracting firms learn of its benefits.

In every job of any size the procedure followed is to bid for the work just as though the material were in stock and then, if the job is acquired, to order the entire requirement direct from the jobber, to be delivered on the job. There are several advantages to this system, not the least of them being that all items of expense, such as delivery, are handled by the jobber and included in the one bill. The contractor's overhead is reduced because of the bookkeeping saved and there is no danger of overlooking the proper charges which must be made against a given job. So far is this carried that in jobs where there is no place for storing the material, the delivery is made by the jobber to a warehousing company which delivers it as called for to the work. This method was used in handling the extensive street lighting jobs which have been handled by the firm.

Another advantage of this method of doing business is the fact that with clean shelves there is no temptation to substitute other material than that called for in order to use up stock on hand. The customer is made aware that whatever he specifies is all the same to the contractor, who will simply go out and purchase it as listed.

This means also that each job can carry itself financially. Bills are sent in promptly at the first of each month and payments as a rule are prompt. Indeed, if payment is but one month overdue, it is listed as a bad debt and a lien placed on the building. Real care in selecting customers, with a careful checking of their credit and business record before taking the job, however, has practically eliminated the difficulty of collection.

Payment can then be assumed on the first. As payment to the wholesaler must be made on the fifteenth, it is evident that, barring accident, no additional capital is required to carry on the work. In all cases, however, the firm believes in taking discounts. Interest on a loan from the bank sounds high when 8 per cent is mentioned, but as a matter of fact this is usually only for a few days' time and the actual cost of borrowing the money is small compared to the saving made by taking the discount. In one case the payment of $9 to the bank in interest on money borrowed meant a saving of $300 to the firm in discounts.

In thus balancing payments monthly it is obvious that all the materials required for a job are not necessarily purchased at one time. Here, too, the monthly yardstick is used. The way this works out is shown by looking at the figures on a job which the company handled at cost plus 15 per cent. This sounds like a small return, but by carrying each month's account as though it were a separate job, it was possible to do a business which came to $55,000 over eight months' time with no greater investment at any one time than $5,500. There was an actual profit of about 120 per cent on the money involved.

The office from which this business is handled is on the first floor of a building which, although desirably located, has other drawbacks which unfit it for merchandising. This gives the firm a frontage on the sidewalk, a direct connection to the storeroom below and adequate space not only for transacting business with customers, but also for the men who make up the field organization to drop in between jobs. The working staff varies from 17 to 50. The firm has all the standing in the community of an established business with a headquarters of some consequence and at the same time is not burdened with the overhead which a store would

involve, nor with capital tied up in stock and equipment. Bookkeeping is a simple matter, involving only labor, the bill to the jobber or the warehousing company and the simple item of overhead as listed—bookkeeper, stock man, members of the firm and rent, including the items of occupancy such as telephone, electricity and water, which are implied therein. At any moment the firm knows exactly where it is, for the reason that it knows how much money it has in the bank, how much money it owes the jobber and how much will be paid on the first by the customers for whom jobs are being done.

More contractors doing strictly construction work are adopting this plan.

New Bank Building at Ogden Well Equipped Electrically

Four Water Systems Each with Duplicate Sets of Pumps Among Many Features Designed to Insure Tenants Continued Service

AN outstanding example of the convenience and utility which complete electric service brings to the modern office building is seen in the new twelve-

Night view of the new First National Bank Building at Ogden, Utah.

story building of the First National Bank and First Savings Bank at Ogden, Utah, which was recently completed, and is known as the First National Bank Building.

All equipment in this building is electrically operated, automatic control. Switchboards are arranged for main distribution and sub-metering in order that elevators, heating plant, ventilating plants, and pumping plant costs may be accurately kept and apportioned.

Passenger elevators are the unit multi-voltage, micro-leveling type, with a speed of 10 ft. per sec., equipped with mileage and stop indicators. Motor generator sets for the elevators are 35 hp. each, with unit field exciters. Acceleration to full speed, reverse, and deceleration can be made in about 4 ft. of travel, without any discomfort to the passengers.

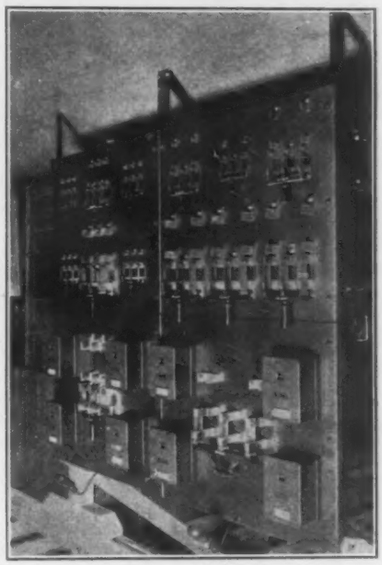
The building is equipped with four separate and distinct water systems, each of which is supplied with pumps in duplicate in the sub-basement. There is a well under the sub-basement floor from which the water for flushing toilets, operating the plunger freight elevators, cooling the refrigerating machine, etc., is pumped with a 15-hp. 3,600-r.p.m. centrifugal direct-connected pump, to a separate pent house tank 219 ft. above the suction intake in the well. This pump is operated with a float switch in the roof tank. The city water is handled through two 7½-hp., 3,600-r.p.m. direct-connected centrifugal pumps to the house tank in the pent house with 185-ft. lift, operated with float switches in the tank. The city water pumps are auxiliary to each other, and both are auxiliary to the well-water pump. A 10-hp., 3,600-r.p.m. centrifugal fire pump boosts the pressure in the fire lines to 350 lb.

A pair of 3½-hp. Bilge pumps pump the sewage originating below the first floor from the sump to the city sewer, a lift of 37 ft.

A 250-hp. boiler heats the building as well as the Central Building across the street. This boiler is equipped with two automatic stokers, two 1-hp. motors on each coal drive, and three ½-hp. motors on each forced-draft fan. All condensation is metered from various sections of the heating plant and returned to the boiler by 2-hp. vacuum pumps. The garbage burner and tank heater are equipped with automatic stoker, using ¼-hp. motor on drive.

A 2-ton refrigerating plant furnishes ice water throughout the building. The refrigerating machine is direct connected to a 3½-hp. motor, and the circulating pump is driven by a 3-hp. motor.

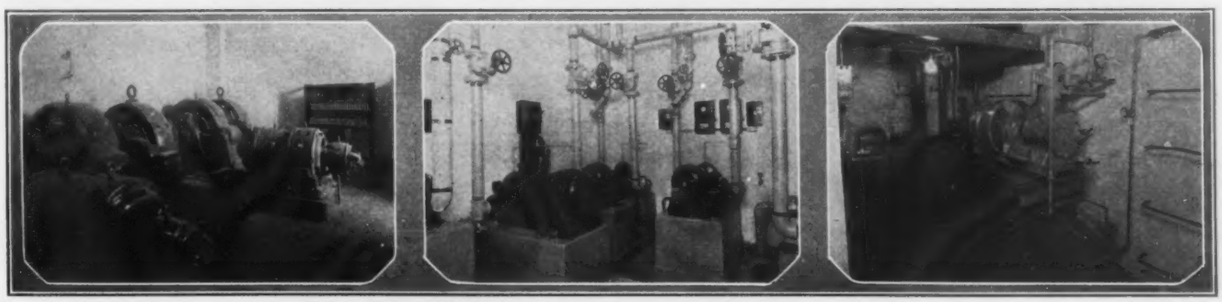
Ventilation is handled by a 3½-hp. motor generator set, furnishing 110 volts d.c. to 13 univents in the banking room. A 4-hp. central fan, direct-con-



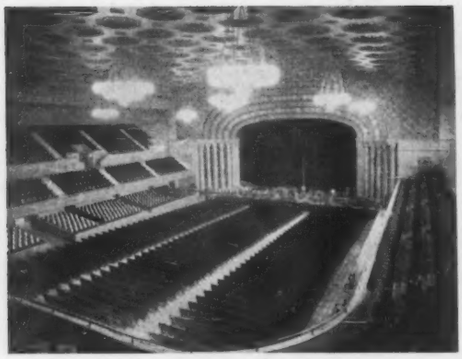
Front of main switchboard, single-phase at left and polyphase on right.

nected, furnishes air to the basement, officers' quarters, vaults, etc.

The building throughout is very well lighted. The corridor lights are wired in vertical circuits and controlled by the engineer in the basement. The second, third, four, fifth and sixth floors are wired for heavy fuel circuits for special appliances, usually used by doctors and dentists.

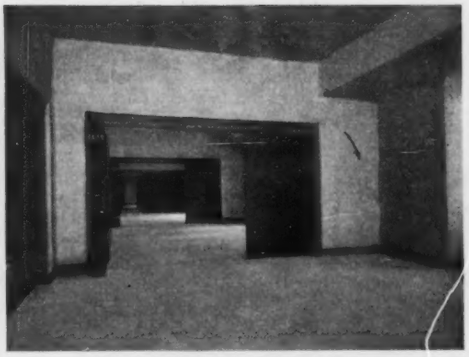


Left: elevator machine room on the 12th floor level, showing hoists, motor-generator sets, micro-leveling motors and signal control board. Center: pump room showing, left to right, circulating, fire, city-water and well-water pumps. Right: corner of engine room, showing refrigeration machines.



Auditorium, with floor lowered for a play.

Corridor lighting.



Committee room; arrow indicates power panel.

Sacramento Auditorium Designed for Every Requirement

Electrical Equipment for Stage and House Ample to Care for Conventions, Operas, Plays, Pageants or Industrial Shows

MODERN theaters and public auditoriums are so numerous and each one so well equipped electrically that it is to the unusual one or to the unusual feature of any particular installation that attention must be turned.

The Sacramento Memorial Auditorium, recently completed, offers a number of unusual features not only in the electrical equipment itself but in the uses to which some pieces of electrical equipment are put. As a well and completely engineered job electrically it stands forth among the many fine auditoriums completed recently in the West. The thoroughness with which its installation was planned and the provisions for future facilities and equipment will keep the auditorium at Sacramento in a position capable of serving the public for many years in advance of the time.

Perhaps the most unusual feature of the auditorium is to be found in the fact that its main floor can be changed from a level to an inclined floor in a few minutes. When the auditorium was in contemplation every possible use to which a municipal auditorium could be put was taken into consideration. The desirability of using it either as a dance floor or a theater, as a convention hall or athletic ring had to be provided for.

Floor Lowers for Plays

The floor arrangement gives an increased area in the level position because the use of sectional flooring over the orchestra pit increases the floor space by that amount plus the stage area. Seats which would be comfortable when placed on the incline were made for use when the hall is serving as a theater.

The apparatus to lower the floor is as follows:

The floor is supported mainly on five longitudinal steel trusses placed about 19 ft. apart which rest on hinges at one end and with the other end arranged to be raised or lowered by hydraulic jacks. There are two main transverse trusses, one at the hinges and one over the jacks. These trusses with suitable bracing constitute the framework of the tilting platform to which wood plates were bolted as nailing strips for the laminated floor.

The load is carried by the jacks only during the time they are raised or lowered. When in either of the up or down positions the weight is transferred from the jacks to two 10-in. steel columns. These columns have shoulders which rest on bearing plates when lowered, and when raised an 18 x 2½-in. latch plate is slid beneath each one by the mechanism.

These columns are directly beneath the longitudinal girders and the latch-plate operating mechanism is interlocked, so both plates operate simultaneously. The time required for raising the jacks is six minutes and for lowering five minutes.

Two hydraulic jacks are used. They are served by a 5-hp. motor geared to a pump that delivers to a 180-gal. tank. The maximum pressure is 400 lb. per sq.in., the jacks being served through 1-in. hydraulic-pressure pipe.

To avoid the danger that might arise if one pair of jacks worked faster than the other, a vertical rack is pinned beneath two of the longitudinal girders for permanent column support. These racks engage two pinions interconnected by 4-in. shafting so that if there are minor inequalities in the thrust of the two pairs of jacks, this interlocking device partly transfers and helps to equalize the thrust. The travel of the plunger of the jacks is 3 ft., but the total travel at the extreme end of the tilting floor is more, of course, the total difference in level amounting to 4 ft.

A patent has been applied for on the scheme for raising and lowering the floor by James S. Dean of Dean & Dean, architects, Sacramento, who devised the entire plan. The structural engineer on the building was M. W. Sahlberg, and Chris H. Snyder was consulting structural engineer. The electrical installation was engineered by G. M. Simonson and Robert L. St. John.

Stage Switchboard Unique

In laying out the electrical installation first attention was given to the stage equipment. The stage switchboard is a five-scene, pre-set automatic switchboard manufactured by the Drendell Electric & Manufacturing Company from designs made by the engineers. It forms the pilot and control panel for stage and house lighting and is located to the right of the stage in a recess, to allow quick exit before the first drop curtain.

Main entrance to the auditorium.

It can be pre-set for five separate scenes and any combination of the five may be used without interfering with the others. Also it can be set back to any previously pre-set arrangement during the show. Any light or set of lights, however, can be cut in or out at will. The entire board can be controlled from a pre-determined remote source by means of a cable and control buttons. Control is also provided for house ventilating equipment in order to enable the stage manager to get an absolutely quiet house for a moment or so during a tense moment in a play.

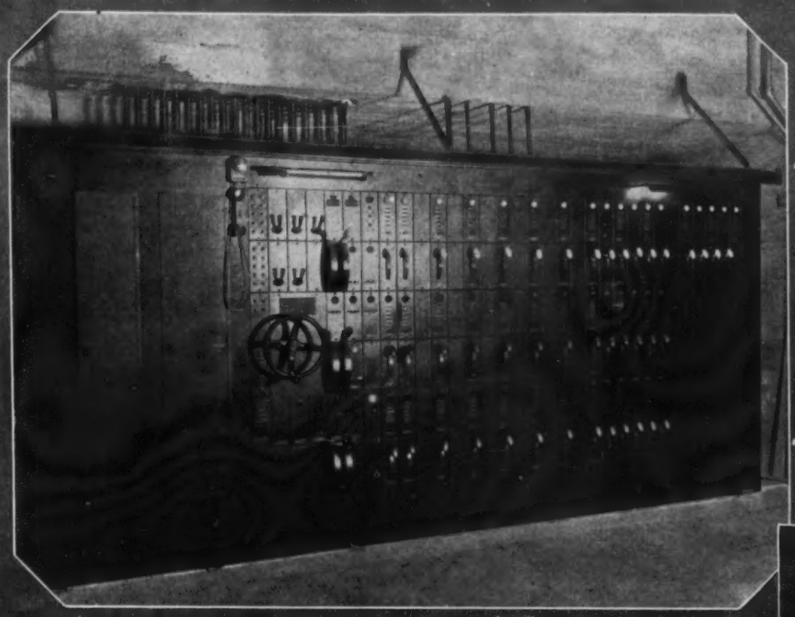
The dimmers are arranged on individual and master sytems. It is possible to intensify and diminish at the same time any pre-set group of units. A complete telephone intercommunicating system, between the orchestra and pit, projection room, fly-gallery and office is provided, as well as signals to dressing rooms.

The magazine panel is placed on the stage side of the board in order to give a little more room for actors running from the stage. In this magazine panel all circuits are fused thus keeping all fusing available from the front of the board.

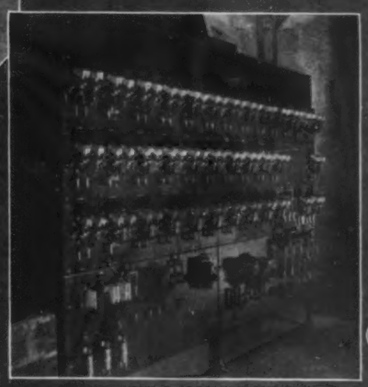
Another feature of the board is that any master switch on a scene can be used as a blackout if so pre-set. Pilot lights are provided to show which circuits are in use. The border spots are so controlled also that any one can be cut in or out at will at the switchboard.

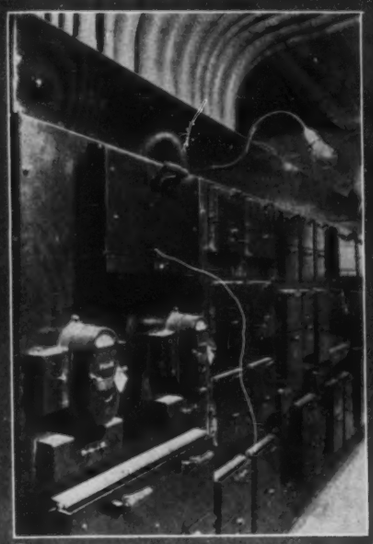
Other Stage Equipment

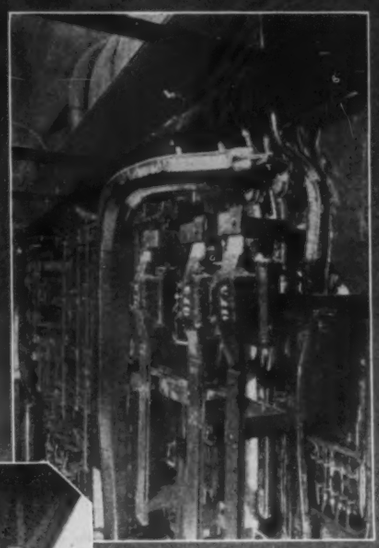
The stage is provided with eight sets of four pockets, one group on each side of which is on dimmers as well as



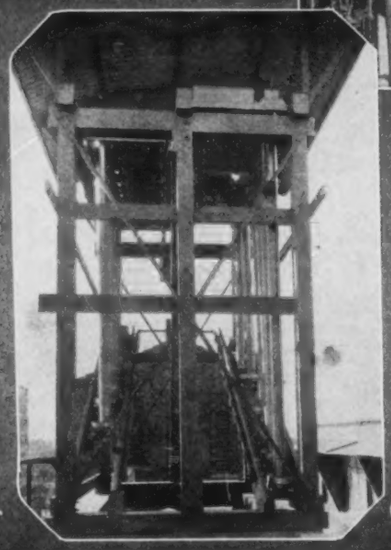
Sacramento's NEW CIVIC AUDITORIUM

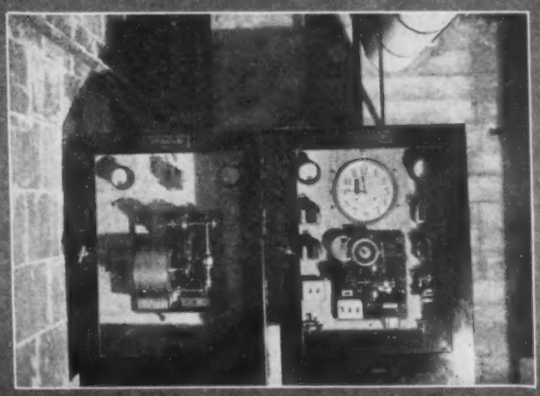






AMPLE capacity for all possible uses is provided in the electrical equipment. (1) The main stage switchboard. (2) Its contactor panel located in the basement. (3) and (4) Front and rear of the main building switchboard. (5) The chimes on the roof operated automatically by the panels (6) in the basement.





full control. Space has been left for the location of a motor-generator set in the basement in the contactor room. By means of a switch d.c. will then be available to the arc pockets. A double receptacle is also provided at the rear of the stage, separately controlled, to be used for effect machines or special arcs. The footlights are so arranged

Basement for auto shows, etc. Arrow indicates a power panel for temporary light or power during display period.

that when the hall is used for dancing they can be lowered and covered by floor sections specially fitted to cover the trough.

The contactor panel is located in a soundproof room directly below the stage. In the same room is the organ motor-generator set, which also provdes current for automatic chimes located on the roof. The chimes were a gift to the city and are automatically operated at hourly intervals during the day by mechanism in a glass encased panel located in this room.

The organ has been built into space provided for it on each side of the procenium opening. Provision also has been made and circuits have been run to control an echo organ that will be located later in the attic at the rear of the auditorium.

Small Amateur Theater

A smaller theater has been provided for the use of community and amateur talent productions. It is 35 x 40 ft., with a stage 15 ft. deep and is located in one of the wings off the auditorium lobby. It is completely equipped with footlights, pockets and border lights for small theatricals, all of which are controlled by a separate stage panel.

A large assembly or committee room is provided on the opposite side of the lobby. Ten rooms, separable or capable of being trown into one, for committee rooms at conventions, each one adequately wired with convenience outlets, are also available. The auditorium is well supplied with dressing rooms, each amply lighted.

Power Available Everywhere

One of the most unique features of the auditorium is the provision made for power when the hall is being used for industrial shows.

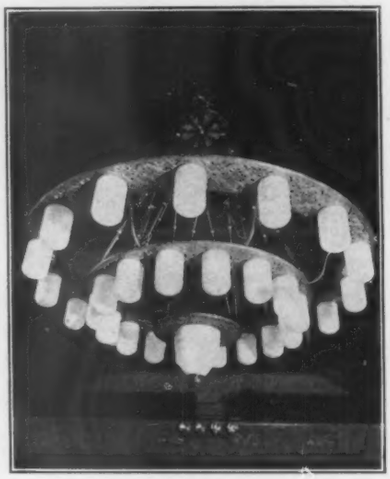
Five power outlets are located on the balcony face each of which is wired for 3-phase 125/216-volt, 4-wire service. Eye bolts are located adjacent to these power outlets so that heavy wire may be stretched across from balcony to balcony over which feeders may be run and dropped into booths or sections of booths when the floor is being used for a large industrial show. A portable feeder, with a panel affixed to the end of it, is plugged in to one of these power outlets and gives control of all temporary lighting and power for displays at the floor level or within the display booths themselves. The total capacity for these outlets is 500 amp.

In the corridors and in the basement power panels and plugs are provided whereby power may be brought to special booth displays when the auditorium is used for industrial shows. Another set of power plugs has been installed on the second floor level in the balcony and is arranged so that either a.c. or d.c. can be used either for balcony arcs during a stage performance or for pageants on the main floor of the auditorium. Each plug outlet is arranged to supply three 50-amp. arcs. Thus a battery of twelve, or 600 amp. in arcs, can be used to flood the auditorium without interfering with any other light or power.

Arrangements have been made for festooning and decorative lighting by means of twelve plug outlets, each on a separate circuit and controlled from the main floor, located near eye bolts from which streamers of lights may be strung across the auditorium at will; 12 kw. can be used in streamers in addition to the other lighting.

There are located in the balcony face, opposite the stage, four floodlights controlled from the stage board to be used in connection with stage productions.

The projection room is fully equipped. It has two moving picture projectors, spots and dissolvers. A motor-generator set is located in an adjoining room.



One of the main central lighting fixtures of the auditorium. Stage floods on balcony face may be seen at center.

House lights as well as the curtains may be controlled from the projection room. High intensity arcs are employed in the projectors as the throw is 185 ft. to the screen.

Public Address System

To take care of convention contingencies a complete public address systhem has been installed.

It is arranged for microphones at two locations on the stage and one in the center of the house to be used in connection with athletic events. There are seven loud speakers concealed behind the procenium arch facing the auditorium. Outlets for six loud speakers also are located on the parapet wall on the front of the auditorium, so that overflow gatherings may be able to listen to performances inside. Outlets are provided also for loud speakers on the east and west fronts of the building on the outside balconies.

A monitor phone system, by means of which someone located outside may instruct the operator as to the reception quality on the outside loud speakers, is provided. In the center of the auditorium an outlet is provided for the concentration of all loud speakers to be let down from the ceiling over a prize ring during athletic events.

Wiring for the public address system is run in special lead-covered cable. The control apparatus and the panel is located under the stage on the opposite side from the organ and contactor equipment in a soundproof room.

The building is served from a transformer vault located under the sidewalk at the north end of the building. This vault is so arranged that a second set of transformers may be installed for any extraordinary demand and removed when this demand is over. To facilitate this the main switchboard has been arranged with switches to divide the load on the separate transformers already mentioned.

The emergency lighting for the auditorium is provided with an automatic throw-over for two separate services. The building is completely equipped for telephones with outlets in every room and at strategic locations throughout the building for use in conventions, etc. A complete fire-alarm system is installed. Telegraph lines have been installed in the building. There is a large elevator located on the street side at the rear of the auditorium, making it possible to deliver heavy trunks or equipment either to dressing rooms or to the basement. A driveway is provided to the basement for use during auto shows, or for deliveries.

Lighting Well Planned

Lighting is very well cared for and has a number of interesting features. For the prize ring a special lighting feature has been designed to throw a flood of light on the ring. Embodied in this fixture is an arrangement for indicating the number of a round. A control is provided at the ringside by which the timekeeper or other official may control the entire house lighting.

The main lighting fixtures of the auditorium are beautiful in design. They were built by the J. C. Hobrecht Company of Sacramento. The fixtures are made of cast aluminum and bronze and are so arranged that they can be lowered by means of winches to the floor of the auditorium for cleaning and relamping.

The electrical installation was made under the direction of M. P. Cannon, electrical superintendent for the Latourett-Fical Company, electrical contractors of Sacramento.

Recently the California State Harbor Board installed an electrically operated winch at the top of the ways at Fisherman's Lagoon, San Francisco, which now quickly pulls the boats up on the ways without effort.

Demand Factors Proposed in the Standard Ordinance

Order Out of Chaos Only Possible When Various Communities Adopt Standards Which Will Make Heavy Duty Installations Uniform

By JAMES M. EVANS, Electrical Engineer, Board of Fire Underwriters of the Pacific, Los Angeles

WHEREVER there is to be an installation of electricity-consuming devices, the owner, architect and electrical contractor feel that the cheapest "safe" job is the desirable one. On the other hand, the electrical inspector is concerned only in the hazardous features of the work.

Wire used to conduct electricity has a limit to its capacity. This limit is determined by the temperature to which it is raised by the heat generated in the wire due to its use. The safe carrying capacity of wires under the ordinary types of installation and usage has been carefully worked out and tabulated in the National Electrical Code. But the inspector is confronted with the problem of determining from the proposed occupancy of the building and the number of outlets (holes in plaster with wires dangling through) just how many watts, and therefore amperes, will be utilized. The architect might know that each of 20 light outlets will be equipped with five 100-watt lamps, but he feels that all will not be in use at any one time. The inspector agrees with him, but what demand factor should be permitted?

Admitting that he did not know, the inspector has camouflaged his position and attributed to each outlet less wattage than he really expected to see installed. This has attained the desired result but has left the industry trying to get onto a solid foundation.

Within recent years there has been a decided feeling that it is better to consider each outlet as requiring a wattage as nearly that which will be installed as possible and still allow a reduction in wire size. Experience has shown certain loads to be used in similar circumstances. From this experience can be estimated the wattage designated for each outlet under similar conditions, yet all such load may not be used simultaneously, therefore a demand factor should be used.

Many organizations have been gathering data on demand factors under many conditions and loads. As they have each used a different set of factors it is difficult to co-ordinate them.

If one city allows a demand factor of 90 per cent and another 80 per cent it is necessary to find out what wattage per outlet was considered by each. The probability is that the first considers each as requiring 155 watts and the second 175 watts.

In order to bring some order out of the chaotic condition which has existed, the California Association of Electrical Inspectors in the spring of 1926 appointed a demand factor committee which was to report in six months. The enormous amount of work required was too great for a final report then or even in the spring of 1927. However, in March, 1927, a tentative report was accepted. This has now been put into final form and is here submitted for further criticism and discussion.

A Thousand to One

(A strong statement regarding wiring costs made at the convention of the Association of Electragists, International, by Earl Whitehorne of the McGraw-Hill Company, who was chairman of the Industry Wiring Conference.)

The real opportunity lies, not in the field of cutting or shaving down the cost of wiring which, today, figures only three or four or five per cent of the cost of building a house. There is more money to be made in another way—a thousand dollars can be made by better selling, where one dollar can be made by shaving on costs.

I think that the feeling among the power industry that the cost of wiring is holding back the development of the industry, towards which their efforts are directed, is simply an unconscious alibi seized upon by men who are constantly confronted by a situation and are uncertain what to do.

It is to be noted that the related points of wattage per outlet had to be considered and made part of the demand factor schedule. The schedule follows:

Demand Factors

a. On a 2-wire branch circuit and on each side of a 3-wire branch circuit the number of outlets shall not exceed twelve; the number of sockets not more than sixteen, and the total connected load shall not exceed 1,000 watts; except as otherwise provided herein. Each plug receptacle connected to a circuit shall be considered as requiring 150 watts except in the dining room, breakfast room or nook, kitchen and back porch or other places where washing or ironing may be done, in which places each appliance outlet shall be considered as requiring 500 watts unless connected to a special appliance circuit as provided herein.

b. For determining the sizes of services, feeders and subfeeders and the wiring of circuits each outlet shall be considered as follows:

	Watts Each
Ceiling outlets, reception hall	150
Ceiling outlets, parlor	200
Ceiling outlets, library	150
Ceiling outlets, living room	200
Ceiling outlets, dining room	200

In rooms having a floor area in excess of 200 sq.ft. the foregoing shall be increased to 1 watt per sq.ft. floor area.

	Watts Each
Ceiling outlets, breakfast room	75
Ceiling outlets, breakfast nook	50
Ceiling outlets, kitchen	75
Ceiling outlets, bedroom	75
Ceiling outlets, all other locations	50
All other outlets except as provided herein	50

c. In rooms having more than one ceiling outlet, each ceiling outlet shall be rated at three-fourths the rating given above.

d. Where there are only bracket lighting outlets in a room, these shall be rated at not less than 50 watts each and their total not less than the rating of a ceiling outlet for that room.

e. Under no conditions shall more than 3 appliance outlets be connected to any 2-wire or either side of a 3-wire circuit, except as herein provided. At least one appliance outlet in each shall be installed in the living room, dining room, breakfast room, nook and kitchen and near an ironing board.

f. Each duplex receptacle shall be considered as two receptacles.

g. An appliance circuit of No. 12 wire may be used, in which case the fuses shall be 20 amp. capacity and not more than 8 receptacles to a 2-wire circuit or on each side of a 3-wire circuit may be installed. Where there are appliance circuits, the first 2-wire circuit shall be considered as requiring 1,500 watts and the first 3-wire circuit as requiring 2,500 watts, each additional 2-wire circuit as requiring 1,000 watts and each additional 3-wire circuit as requiring 2,000 watts.

h. Stores shall be wired as requiring a minimum of 1 watt per sq.ft. of floor area in sales rooms, display rooms, offices, etc., and 3/10 watt per sq.ft. floor area in storage rooms, stock rooms, toilets, dressing rooms, passage ways, halls, etc. Show windows having 50 sq.ft. or less shall be wired as requiring a minimum of 15 watts per sq.ft. floor area and those having a greater area of 10 watts per sq.ft. floor area.

i. In addition to that required by "h" circuit capacity shall be provided for signs and other exterior lighting. Where no show-window lighting is provided an extra circuit shall be run to an outlet just back of each show-window location and fuse location provided for each circuit on the panelboard.

j. In determining the total connected load each branch circuit shall be considered as carrying the total wattage which is permitted to be connected to such circuit. Power factor of heating and lighting loads shall be assumed as 100 per cent.

k. Demand factors as follows may be used:

Domestic ranges and air heaters in apartment houses, etc.—

	Per Cent
1- 2	100
3	90
4	85
5	80
6	75
7	70
8	65
9	60
10	55
11-20	50
21 up	40

Lighting circuits in apartment houses—

No. of Circuits	Per Cent
1- 5	100
6-10	90
11-15	80
16-20	75
21-25	70
26-30	65
31-35	60
36 or more	50

Lighting circuits in other locations—

	Per Cent
Churches	100
Clothing manufacturing plants	90
Department stores	90
Foundaries	75
General manufacturing plants	75
Hospitals	60
Hotels	75
Machine shops	75
Office buildings	80
Packing houses	80
Printing establishments	80
Public garages	75
Residences	70
Restaurants	100
Schools	90
Stores (general)	100
Tanneries	75
Theaters	100

l. If at any time after the equipment is in operation it shall be found that it is necessary to overfuse the conductors in order to carry the maximum demand, the conductors shall be replaced with large enough ones to carry the maximum demand without over-fusing.

Question Box

Q. What is a static neutralizer?—D.S.T.

A. A device designed to apply a high tension static discharge of opposite polarity to the one causing trouble, the discharge being adjustable to suit the conditions prevailing. It is used to counteract the effect of frictional static in certain industries.

Q. Can you give me the formulas for copper strands—J.A.R.

A. Let D = diam. of wire in mils.
N = No. of wires.
C.M. = Circular mil. area.

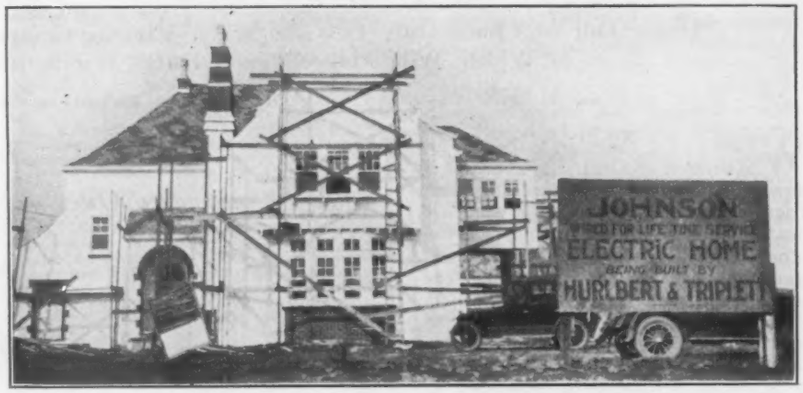
Then, $C.M. = D^2 N$

$N = \frac{C.M.}{D^2}$ $\quad D = \sqrt{\frac{C.M.}{N}}$

Q. What is the contraction of malleable cast iron?—C.F.H.

A. 3/16″ per foot.

Wants Higher Standard Than Red Seal



The Red Seal standard is not high enough for George Johnson of Yuba City, Calif.

"Oh, the Red Seal Plan is all right as a starter," says Mr. Johnson, "but it doesn't go far enough. I want something that I can sell above the ordinary wiring job. Anybody can do the ordinary wiring job—and for that matter the Red Seal job. But to me the Red Seal is a minimum standard of adequacy and I want a plan which is a real goal to shoot at."

Mr. Johnson did the first Red Seal job in the vicinity of Marysville, Calif., and is still doing Red Seal jobs. However, his ideal is to wire homes with convenience far beyond that required in the minimum requirements of the present Red Seal standard.

Mr. Johnson believes in advertising and every house he does carries a big sign such as may be seen in the accompanying photograph, with the wording, "Another Johnson electric home, wired for lifetime service."

Contractors Can Estimate Ventilation Jobs

While Large Building Ventilation Calls for Engineering, the Average Run of Small Building Problems Can Be Solved by the Estimator

By J. R. Wilson*, Quality Electric Works, Los Angeles

Electrical Estimating Series—XXX

AFTER interviewing numerous electrical contractors the writer is convinced that a large field of possible revenue is being neglected by these men owing to their belief in the mistaken fallacy that the application of electric ventilation requires a large amount of mechanical, electrical and chemical engineering knowledge. The stock answer to the question, "Why don't you sell more ventilating fans?" is usually about as follows: "Oh, I haven't the time to make a study of the subject, and I'm afraid to install something I don't understand."

This attitude would be admirable if the viewpoint were correct. This does not mean that the application of ventilation to extremely large jobs should be attempted by the electrical contractor without the aid and advice of the engineering staff provided by the manufacturers of ventilating equipment. The rules and principles pertaining to the installation and application of electric ventilation to the job of medium size are extremely easy to comprehend and apply. Each estimator and contractor should understand the few rules that are necessary so that intelligent recommendations may be made to the customer.

Why Ventilation?

To sell **anything** intelligently and successfully the seller must first understand (and himself be sold on) the product he is selling, and so with ventilating equipment the first question is **why ventilation?** And the answers are:

1. For safeguarding *health.*
2. For greater *comfort.*
3. For increased human *efficiency.*

To those whose memory can carry back to their school days the following statements will be familiar:

1. Human beings breathe on an average of 17 times per minute.
2. The lungs consume oxygen—which combines with the impurities contained in the blood.
3. Comfort requires the supplying of about 30 cu.ft. of pure air per minute per person.
4. Air is a mechanical gas—not a chemical gas.
5. Sanitation is absolutely essential to health, and sanitation requires the total elimination of smoke, odors, gases, etc.

GOOD ventilation is economically and hygienically necessary for all who must remain indoors. In order to insure good ventilation and a profitable installation, reliable ventilating equipment must be used. A satisfied customer—one of the contractor's most valuable assets—can be obtained only by supplying good apparatus properly installed. Any enclosed place, where persons reside, work or assemble, is a prospect for ventilating equipment.

Size and Type of Equipment

Ventilation may be divided into two classes—the removal of undesirable elements by the process of **exhausting** them from the prescribed area, or by furnishing a constant supply of fresh air by **blowing.** The more common practice is by means of **exhaust fans** and this method will be treated first. The basis of the exhaust fan method is "air changes per minute," and the number of air changes for any given area is dependent upon the type of use for the occupied area, elements to be removed, and surrounding conditions.

In estimating the type and size of equipment all calculations are made on a basis of: cubical contents of the space being considered ÷ air changes per minute = cu.ft. of air per minute. To obtain the first factor multiply the length, width and height of the room. To obtain the second factor divide the first result by the recommended number of changes (as given in Table A herewith) and the result will be the capacity, in cu.ft. per min., of the fan necessary to do the work.

* All rights reserved by the author.

Example

Room 75 ft. long x 20 ft. wide with 15-ft. ceiling used as hotel kitchen. Recommended air change: every two minutes. (See Table A.)

1. $75 \times 20 \times 15 = 22{,}500$ cu.ft.
2. $22{,}500 \div 2 = 11{,}250$ cu.ft.

By consulting the catalog covering the make of fan it is desired to use the proper size of fan may be selected.

Before making this selection it will be necessary to know what current supply is available, i.e., 50 or 60 cycle single or three-phase, or direct current. The work done by the fan is dependent upon the speed, and this of course varies with the frequency of the supply circuit.

With d.c. current the basic speed is the same for both 110 and 220 volts, but a speed controller is usually furnished with each fan. As an example: A 30-in. fan of a well known make has

Fig. 1. Wrong way to place fan for ventilating small store.

a capacity of 7,300 cu.ft. per min. on 60 cycle, while on 50 cycle the capacity is only 6,083 cu.ft. per min. On direct current this fan would have a capacity of 7,300 cu.ft. per min., the same as on 60 cycle a.c. On exhaust fans it is essential that the specified frequency be correct for the available current supply. In selecting a ventilating fan make sure that large enough equipment is used. A fan which is too small is a waste of money and a continual disappointment.

In the foregoing problem, used as a typical example, the solution given was based upon "free inlet and free discharge," which means no obstruction to the air entering the fan, and no obstruction to the discharge of air from the fan. In the majority of so-called simple ventilating jobs these conditions will maintain. It must be borne in mind that so-called "exhaust" fans are intended for installation in outside walls, windows or transoms. Under certain conditions they may be used also with very short duct extensions, if the rules to be given herein are strictly adhered to. Where extended duct systems are necessary only "blower" type of ventilating equipment can be used. Even where no ducts of any kind are used certain proved rules must be followed or the installation will prove unsatisfactory.

Right and Wrong Methods

After the apparent size of fan necessary for the installation has been determined the next step is to decide where the fan is to be placed. As the majority of installations are made in rooms of oblong shape this type of problem will be first considered. By referring to Fig. 1 and Fig. 2 graphical representation of the right and wrong methods of installation, and reasons therefor, will be readily grasped. In Fig. 1 it will be noted that the fan is doing very little work. As only a small part of the room is subjected to the influence of the fan's action very unsatisfactory results will be obtained. It will be noted that the air "short circuits," leaving the space at rear of the room "dead," or unventilated. In Fig. 2 is shown the correct way to do the same job. By placing the fan directly opposite the points of intake a complete circulation is created through the entire space to be ventilated. For best results all openings should be kept closed on the side of the room where the fan is located. Otherwise the air will be "short circuited," as shown in Fig. 1.

Selecting the Fan

Exhaust fans are made in many sizes and usually in both high and low speed types for each size. In selecting the fan it should be borne in mind that in cutting the air the fan blades produce a whistling sound. The higher the speed at which the fan operates the more noticeable will be this sound. The slower the speed of the fan the less will be its capacity in cu.ft. per min. As a general rule slow speed fans should be used in places where noise is objectionable, such as offices, stores, residences and similar locations. In factories and industrial plants, or other places where noise is not particularly objectionable, high speed fans should be used. While the high speed fans require motors of large horsepower, and therefore will cost more, the cu.ft. per min. capacity is 25 to 50 per cent higher. In some cases this may mean the difference between purchasing one large fan of high speed or purchasing two fans of slow speed to obtain the desired capacity.

Some Things to Avoid

Some contractors make the mistake of recommending the placing of fly screens on the outlet side of propeller fans. This is a mistake for the reason that dust, grease, grit, etc., will soon clog the openings up so that it will be impossible for the air to get through. In fact the screen itself offers nearly 50 per cent resistance even when it is clean. Under no circumstances should screens be placed on the outside of a fan.

Another mistake is to use a door on the outside of a fan. If the door should inadvertently remain closed while the fan is in operation, the motor will be overloaded, resulting quite frequently in the motor being burned out. The door may be blown shut by a strong outside wind, with the same result. Almost every manufacturer of fans can supply automatic shutters to be attached to the outside of the fan. These shutters are so designed as to open automatically when the fan is placed in operation, and to close when the fan is stopped.

Best practice prescribes the use of these shutters on all fans placed in outside locations. Their use will prevent the ingress of rain, snow, sleet, dust, odors, etc., when the fan is not in operation. Another point which should be considered is the placing of the fan with relation to the prevailing winds. As far as practicable the fan outlet should be placed so as to face away from the prevailing winds. A most important point to remember, in deciding upon the location of the fan, is the use to which the fan is to be put. If the duty is to be the removal of heat, smoke, odors, light dust, or similar waste products, the fan as a rule should be placed high, because these substances have a tendency to seek higher levels than that from which they originate. On the other hand, gasoline vapors, heavy dust, some acid fumes, and similar by-products, seek the lower levels of enclosed spaces, and the fan inlet should be placed close to the floor if satisfactory results are to be obtained.

TABLE A

Class of Building	Air Should be Changed
Bakeries	Every 3 minutes
Cabins	Every 5 minutes
Conduits	Every 1 to 10 minutes
Dining rooms	Every 5 to 15 minutes
Foundries	Every 5 to 10 minutes
Farm barns	Every 10 minutes
Garages	Every 5 to 10 minutes
Halls	Every 5 to 10 minutes
Laboratories	Every 3 to 10 minutes
Laundries	Every 2 to 5 minutes
Lodge rooms	Every 10 minutes
Office and stores (depending on climate)	Every 5 to 10 minutes
Projection booths	Every 2 minutes
Restaurant and hotel kitchens	Every 2 to 3 minutes
Residence kitchens	Every 2 minutes
Ship holds	Every 10 minutes
Theaters	Every 2 to 10 minutes
Toilets	Every 3 to 5 minutes
Tunnels	Every 1 to 10 minutes
Workrooms and factories (depending on climate)	Every 5 to 10 minutes

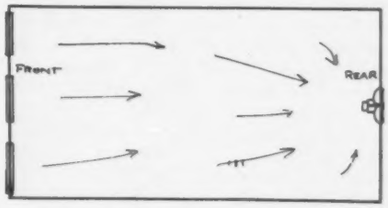


Fig. 2. Right position for mounting ventilating fan.

For other crowded rooms at least 30 cu.ft. of air per person per minute should be allowed for ventilation only. If noxious gases, fumes or heat are present, proportionately more air must be allowed. In the above list, where variable air changes are given, the lower figures should be used for the worst conditions and the higher figure where conditions are above the average. In the warmer sections of the country, or other especially hot locations, where the removal of heat is important, the volumes of air obtained by the formula given herein should be doubled.

The next installment will deal with the use of ducts for the conveying of air, and several illustrations of right and wrong applications will be given.

Better Merchandising

To Make Any Community a "Christmas City"---

What Denver and Salt Lake City Have Evolved in the Way of Successful Plans for Conducting City-wide Electric Decorating Programs

YEAR after year Denver has garbed itself in light and become the "Christmas City of the World." Last year Salt Lake City too was resplendent with lighting decorations. This year Spokane is to bedeck itself in light for the holidays. Perhaps other communities, following the simple plan pioneered by Denver or some more localized plan, will also turn themselves into brilliant Yuletide festivals of light. The plans used by Denver and Salt Lake City are described here in order that other communities, even now, may organize Christmas lighting programs for their communities, which if not equaling those of the Rocky Mountain cities, will at least serve as an impetus for greater and earlier efforts next year. More data are available from the Society for Electrical Development, the California Electrical Bureau, the Mazda lamp manufacturers, and the electrical leagues sponsoring the campaigns in this year's or last year's "Christmas Cities."

By GEORGE BAKEWELL, JR., Executive Manager, Electric League of Colorado.

FOR SIX consecutive years the electrical supply jobbers of Denver, Colo., have underestimated the demand that has been made upon them for miniature Christmas-tree sets, colored lamps, tree holders and illuminated wreaths, prior to and during the holiday season. Anticipating the tremendous volume of business that they might do in this line of merchandise, they have placed generous orders with the various manufacturers, but invariably the demand exceeds the supply.

The Electrical League of Colorado's persistent efforts to "Make Denver the Christmas City of the World" is the factor that has brought about such a delightfully deplorable condition.

There is no mystery in connection with the success of the Christmas Outdoor Lighting contest in Denver and environs. Fundamentally this promotional activity is sound. Christian men and women are thus encouraged to share some of their yuletide spirit of "peace on earth, good will toward men" with their fellows, and they respond—generously. Friendly neighborhood rivalry is promoted.

It is human nature to enjoy contests, and added to this one is the incentive that the contestants, win or lose, are entitled to the honor of having encouraged civic pride. It has now got to the point where home owners are ashamed to admit that they have not arranged at least a modest electrical decoration during the holiday season.

Without newspaper publicity, Denver's Christmas lighting acticity could not have assumed the proportions that it has. In this respect the league is particularly fortunate, because it has secured the whole-hearted support of the local press and for several years past a feature writer has devoted her attention to the contest from early November until after New Year's Day. No paid advertising whatever is used and yet last year 1,835 column inches of free newspaper publicity was secured, much of it on the front pages.

Should the league decide to withdraw its support from this activity (as it will not do) it is practically certain that the citizens of that community would continue to decorate electrically at Christmas time. Their materials do not wear out but are held over year by year, and the equipment becomes more elaborate.

Sweepstakes winners receiving prizes from Executive Manager Bakewell.

New lamps are bought to replace those burned out; additional stringers and clusters are purchased.

Each individual feels the urge to improve upon the installation of which he was proud the previous year, because of the new ideas that he has obtained through his trips over the city while visiting the homes of his friendly competitors at Christmas time.

Due to the number of requests that we are receiving for information regarding Denver's Christmas Lighting Contest, we have thought it advisable to draw up an outline of the local activity which we might incorporate in our letters to those who have written in asking specific questions. This information follows:

1. *Personnel*—All details are left in the hands of the league manager. It is his duty to zone the city, select prizes, appoint judges, keep the newspapers informed or occasionally prepare news articles for the press, assist in the judging, secure photographs of unusual installations and assist in the prize distribution.

2. *Costs*—Denver's 1926 contest cost $360, of which amount $210 was spent for prizes. The balance represents the cost of photographs, judges' dinners, professional entertainment during the radio publicity programs, etc.

3. *Publicity Mediums*—For the past six years Denver has used one daily paper to support the contest. In order to gain this support, the paper was encouraged to announce the activity as "The Denver Post-Electrical League Christmas Lighting Contest." The paper thus assumed most of the glory and has received at least the verbal approval of various civic and commercial associations. One feature writer on the editorial staff has contributed her time to the contest each year; suggestions were given to her by the league. A total of 1,835 column inches of free publicity, much

of it on the front page, was printed last year. In addition the league prepared a musical program that was broadcast by Denver's largest radio station prior to Christmas. A ten-minute talk, "Holiday Decorations," was given during this program. Letters were likewise mailed out to a selected list of the city's larger merchants, urging them to decorate their stores and homes.

4. *Zoning*—In order that the contest might be equitable to all competing for residence prizes, the city was divided into five zones, thus the entrants competed with those in their own financial class.

5. *Prizes*—In each of the five zones four prizes were awarded to contestants having the most original and artistic residence installations in that district. Three sweepstake prizes were likewise awarded for the three most effective residence installations in the entire city. A contestant was eligible to but one prize.

In addition to awards made for residence installations, the league provided loving cups as prizes for the following installations: large store and business house, small store and business house, hotel, institution (such as hospital, school, etc.) and office building. Desk lamps were provided for the most effective decorations on churches and apartment houses. One of the rules of the contest was that competing installations be in operation from Dec. 22 to Jan. 2.

Salt Lake City Campaign

ENCOURAGED by the success attending its first Christmas Cheer Week lighting contest held during the Christmas season of 1925, the Salt Lake Telegram, in conjunction with the Electrical League of Utah, conducted a similar activity in Salt Lake City during the week from Dec. 24, 1926, to Jan. 2, 1927.

The contest was conducted on a much larger scale than that of the year before, with the result that the idea of spreading Christmas cheer with light took hold to a much greater extent, and the glowing night beauty of the city during the holiday season was a sight long to be remembered.

The general rules and details of the contest were similar to those of the preceding event. The residential district was divided into three zones, with a set of equal prizes for each zone, a total of ten prizes being awarded in each section. These prizes were as follows:

First—$25 in cash, $40 in electrical merchandise or a trophy cup.
Second—$20 in cash.
Third—$15 in cash.
Fourth—$10 in electrical merchandise.
Fifth—$10 in electrical merchandise.
Sixth—$10 in electrical merchandise.
Seventh—$5 in electrical merchandise.
Eighth—$5 in electrical merchandise.
Ninth—$5 in electrical merchandise.
Tenth—$5 in electrical merchandise.
Grand Sweepstakes Prize—$25 in cash.

The rules provided that these prizes should be awarded for the best electrically-illuminated Christmas displays, each display to be visible from the street, and to be lighted each evening from Dec. 24 to Jan. 2, inclusive, during the period from dusk until 9:30 p.m.

Apartment houses also were included, in a special classification, one award being provided for the best display of this class. This award consisted of $25 in cash or $40 in electrical merchandise.

A special classification also was provided to cover the downtown business section, three awards, in the form of trophy cups, being given for the best window or Christmas tree displays made by merchants, classified as to foot frontage. These prizes were won by The Paris Company, Consolidated Music Company and Day and Night Clothes Shop. This served to augment the downtown Christmas decoration program launched by the city's chamber of commerce, which included the placing of alternate red and green cloth covers over the lights in the whiteway system, one light on each standard being so designed; the placing of hundreds of large Christmas trees in sockets along the curb; and the hanging of artistic wreaths at intervals on guy wires near the center of a number of the downtown streets. A number of the merchants decorated and illuminated the Christmas trees in front of their places

Decorated window which won first prize in district B, Denver, represents the Nativity.

of business. The result was a blaze of Christmas lights which would have to be seen to be appreciated. Salt Lake City never saw anything like it before.

A pleasing feature of the program was the civic spirit manifested by state, city and county officials. At the state capitol a beautiful electrically-illuminated tree sent forth its message of Merry Christmas from a point near the front entrance of the building; five large trees, attractively decorated and lighted, were displayed in two of the city parks; and at the Salt Lake County Hospital grounds was displayed one of the most artistic electrically-illuminated trees in the city.

Letters were received by the committee in charge of the activity from Governor George H. Dern, Mayor C. Clarence Neslen, and City Commissioner Harry L. Finch, endorsing the Christmas Cheer Week idea, and wishing them the utmost success in the enterprise.

A large amount of publicity was carried practically each day in the Salt Lake Telegram between the dates of Dec. 5 and Jan. 3, a number of cuts being used to put the idea over. The Electrical League of Utah made good use of its famous animated sign in the residence district by portraying an electrically-illuminated Christmas tree in the front yard of an attractive home. Animation was provided by means of a flasher.

A letter-writing contest also was conducted, through the Salt Lake Telegram, providing two prizes of $15 each in electrical merchandise to the writers of the two best letters (one being an adult and the other a child under 14 years of age) setting forth reasons why Salt Lake City homes should have electrically-lighted Christmas displays during the holidays. A prize of $1 in cash also was awarded to the writer of each of these letters which was published. A number of them got into print and proved of much value in giving publicity to the lighting contest.

Placards featuring the slogan, "Spread Christmas Cheer With Light," were displayed in the store windows of all electrical firms in the city, and were so designed as to promote the idea of having every home display at least a red and green lamp in twin socket. This resulted in a wide distribution of this simple form of decoration.

As a result of the Christmas Cheer Week activity Salt Lake City partook of the most beautiful and the most impressive Christmas spirit in the history of the city. There were many hundreds of displays, and their variety, originality and brilliance awakened universal admiration. Although a great many of them did not enter the contest, being seemingly content with doing their bit just as a matter of pleasure and pride, nevertheless the spirit of saying "Merry Christmas" with light was manifest as never before in Salt Lake City.

The general program was in charge of the Exhibits and Displays Committee of the Electrical League of Utah, of which M. L. Cummings, Jr., of the Utah Power & Light Company, is chairman, and which comprised the following additional members specially appointed for this activity: W. J. Berryman, Mine & Smelter Supply Company; B. C. J. Wheatlake, General Electric Company; J. C. Jacobs, Apex Electric Company; R. M. Bleak, Utah Power & Light Company, and C. L. Collins, field secretary of the league. The league's Lighting Service Bureau, which handled the downtown portion of the campaign, consists of the following: Thad J. Stevens, Stevens Sales Company, chairman; L. B. Gawan, Utah Power & Light Company; Ernest L. Dee, Edison Lamp Works; and Edward A. Evans, Westinghouse Electric & Manufacturing Company.

Denver and Salt Lake Prize Winners

The photographs on page 322 are of the prize winners in Denver's last Christmas decoration contest. (1) Gano-Downs Store, first prize, commercial installation. (2) One of the entrants. (3) First sweepstakes prize winner, the city electrician's home. (4) Second sweepstakes prize. (5) Winner of the special prize. (6) Winner of first prize, district E.

The photographs on page 323 are of prize winners in Salt Lake City. (1) Winner of special prize for exceptionally beautiful display. (2) First prize, district 3, home of E. R. Smith. (3) First prize, district 1 and grand sweepstakes prize, home of Dr. G. A. Allen. (4) Third prize, district 2, home of J. Warren Beless. (5) Child's playhouse, residence of Carl Scott, first prize, district 2.

RADIO --- Its Gift Appeal

NOT only does radio equipment lend itself to effective though simple Christmas window display treatment—a few well chosen pieces, a wreath and some other small decorative piece, such as the tall candles shown in the picture at the right, being enough to set off the merchandise—but radio enjoys a strong Christmas gift appeal. Often a more useful piece of apparatus, such as a range or a washing machine, makes no hit at all as a gift. It does not have the luxury touch which a radio will have. A well built radio, besides its appeal as a musical instrument, is a good looking piece of furniture for any home. And for those who crave a little luxury in their Christmas gifts, and many, many people do, the better grades of radio are just the ticket. Too often a dealer will labor under the idea that low price is all that a Christmas shopper asks. He must remember that by far the greatest number of buyers of decorative radio sets are like the young bride who cooed to her husband, "Dearie, I'm sure we can get along without ever so many necessities if only we may have a few luxuries!"

WHEN there are two windows available the wise merchandiser will find it to his advantage before Christmas to fill one with radio and the other with appliances which make attractive appeal as gifts, such as spotlight heaters, warming pads, toasters, waffle irons, percolator sets, irons—for irons always sell and the small traveling iron makes an especially fine gift—and other appliances of like nature. To decorate a window for Christmas is not so much a matter of lavish equipment as it is a simple matter of good taste. The two windows below, facing windows of the Newbery Electric Corporation, Los Angeles, demonstrate how an effective display may be made from merchandise well placed, a few well chosen dealer help cards or cut-outs, and a wreath and some fringe and metal cloth.

THE ROCKY MOUNTAIN NEWS, DENVER, COLORADO, MONDAY, DECEMBER 12, 1926
"Merry Washdays!"
What a wonderful gift—a Maytag! It brings a smile of happiness not only for Christmas alone but renews the same spirit of gladness every washday for years and years.
Merry Washdays! Shorter Washdays! Comfortable Washdays! Washdays without hand-rubbing! Washdays so easy and comfortable you actually enjoy them!
Washdays that give you clothes washed spotlessly clean and you hardly notice the little time and effort spent to accomplish such wonderful results.
Life-lasting happiness! What gift so enduring as a MAYTAG!
Any Maytag dealer will send a Maytag to your home to do a week's washing free. There is no obligation to buy except the one that you owe yourself. If the May
THE MAYTAG COMPANY,
Phone any of the authorized Maytag
COLORADO

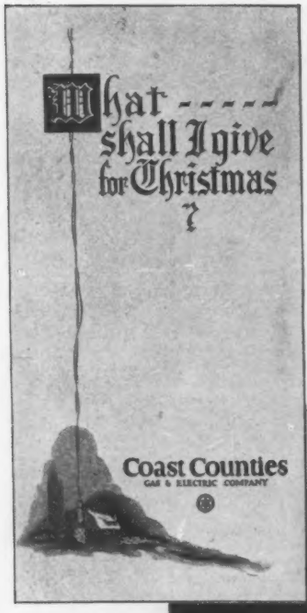
Make This an
ELECTRICAL CHRISTMAS
Universal
Electrical Gifts
When you buy your electrical gifts at the Universal store you get the best goods at lowest prices—Satisfaction assured.
Universal Percolators ... $8 to $15.50
Universal Toasters ... $5 to $15.50
Universal Coffee Cake Baker ... $15
Universal Waffle Irons ... $5 to $15.50
Universal Table Stoves ... $5 to $9
Universal Toasterettes ... $5 to $7.50
Universal Vacuum Sweepers ... $125
UNIVERSAL STORE
1201 Broadway

Say Merry Christmas With Electrical Appliance Presents
Electrical appliances can be selected for every one—especially for Her X-mas.
For mother, a new electric range or washer; for father and mother together, new percolator, toaster, grill; for grandpa or grandma, a new electric pad or foot warmer; for sister, a new electric curling iron, and for the entire household an electric heater and other wonderfully useful appliances. Choose now in the Electric Shop—pay cash or buy on terms.
Dolly Madison Urn Set
Hotpoint Waffle Iron .. $11.50
Majestic Air Heater .. $7.50
Christmas Gift Special
Hotpoint Percolator $10.50
50c Down
$1.00 a month with light bill
Pound of Imperial Coffee
The Washington Water Power Co.

What Mother really wants
Mother Deserves the Best
An Automatic Hotpoint Electric Range
Make Sure!
Place Your Order Early This Week for New All White HOTPOINT AUTOMATIC
"Christmas Range for Mother"
A Complete Electric Kitchen
$7.50 DOWN
Merry Christmas Porch Lights
This $10.50 Hotpoint Percolator
FREE
DECEMBER SPECIAL
Hotpoint Electric Percola
$10.50
50c Down
$1.00 a Month With Light Bill
FREE
Pound of the Imperial Coffee
Children can pool part of their Christmas money and buy an electric "Christmas Range for Mother." Pay only $7.50 down.
The Washington Water Power Co.

A smart husband . . . figured this out
It is true, almost every woman wants electric refrigeration. And before long most women will have it. Therefore it is a wise husband who makes it his Christmas gift to his wife this year. She will get a big thrill out of it. And he will save himself the purchase later on.
As simple as 2 and 2
Rugged enough to last a lifetime
Coldak's exclusive feature means greater power
Coldak in your own refrigerator
A strong organization
COLDAK
Western Appliance Co.
1122 Broadway. Main 9194.
GLOBE ELECTRIC SUPPLY CO.
1843 Wazee Street
COLDAK CORPORATION . . . New York . . . Philadelphia . . . Boston . . . Pittsburgh . . . Cleveland . . . Denver

Notable in this Christmas season advertising is the clever representation of a utility article for a gift purpose—the washing machine, range, refrigerator and lighting fixtures, especially.



YULETIDE IDEAS Which

¶ THE REAL TEST OF SALESMANSHIP comes at the holidays. Every type of merchandising business looks to that time for extra business—plans for it, decorates for it, advertises and draws crowds of shoppers and SELLS its particular brand of merchandise, be it patent medicine or automobiles. The electrical dealer, by following similar tactics, can compete successfully and increase his share of the Christmas business. The following suggestions are offered because they have sold appliances for others and can be adapted to this year's selling.

This folder was sent this year to every home served by the power company, suggesting electric gifts for Christmas presents to people trying to make up their minds what to give. They are urged to "see them at your electric dealers." "We have issued something similar to this for the past few years and we feel confident it does increase the electrical dealers' business," says Morris F. Wales, general agent for the company.

The Bookkeeper Lays a Barrage

WHEN holly and evergreen adorn the counters, aisles and chandeliers; when bright lights gleam and gifts are piled high; when sales folk smile and bustle busily about—then the shoppers feel at home in your electrical store and many of the buyers' pocketbooks unfold their golden fleece.

Even the office force, housed away from the noise and the hubbub of many voices, feels the thrill and does its bit, at least so testifies one electrical merchandiser, whose credit man believes in standing solidly back of the sales force by stepping on the gas and going out after customers and bringing them into the store. He sent the following inducement letter to all charge accounts:

Christmas Announcement

Christmas, with its spirit of good-will, is just around the corner, and we are ready as never before to greet it.

This store is noted for its practical electrical gifts—nationally known merchandise of proved excellence—electrical gifts of all kinds for men and women, boys and girls, children and grownups.

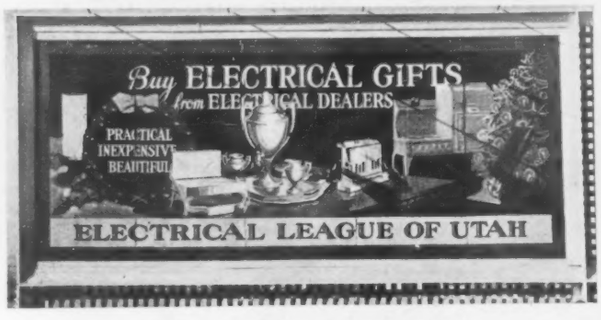
Stocks are at their Christmas best—assortments are full and fresh—and we are all united to speed you through your Christmas shopping.

Your account is satisfactorily established, and all purchases may be applied to it. We shall be glad to see you.

This was signed by the credit manager, and was duly appreciated by the customers, judging by the appreciative response which followed.

Such enticing invitations are never lost in the scuffle of Christmas excitement, and not only does the electrical store find this good business, but the customer has been found to respond in extraordinary fashion.

A similar letter, mailed to prospects, with slight changes in wording, has induced the opening of many new accounts over the holiday season.



Billboard boosting electrical gifts.

Advancing the electrical range as a gift by means of a large illuminated billboard.

Have Boosted CHRISTMAS ELECTRICAL SALES

Appliances on Tables Encourage Holiday Shopping

How do department stores display Christmas merchandise? Cannot the electrical dealer learn something from watching these more experienced and often more successful merchants in the display of his wares?

From 5, 10 and 15-cent stores up to the most exclusive establishments the principle of having the merchandise where it can be touched and felt and examined has been found profitable.

A Denver dealer capitalized on the Christmas decoration idea with this advertisement.

Too many appliances bask in showcases trying to look like jewelry. Put them on tables in the center of the store. Put them on top of the cases. Let the casual shopper come in—in fact make it easy for her to come in—to finger and examine the appliances.

She isn't sure that she **wants** an electric appliance. She would like to examine it more closely. But to ask to have it taken from a case implies an obligation to buy. "Oh, well," she says, "never mind." And she does not buy. She likes to look about a bit anyway. If she can examine it, very often she will buy it.

Price Tables Often Pay

Another plan which helps the Christmas shopper is that of having several tables for articles of $3.95, $5.95, $7.95 and $11.95, or some such groupings.

Appliances selling for $3.95 are on one table, for $5.95 on another and so on. Such tables should be arranged as many merchants arrange their windows, with the lower priced articles nearest the street.

The effect of each table upon the shopper is that bargains are to be found at each of the various priced tables. The tables, visible from the street, in a well lighted store, are an invitation to come in and look them over.

The bookseller encourages casual visitors to his store by an invitation to "come in and brouse around," knowing that the booklover cannot help buying the books he peeks into.

The department store knows that if it can get women to come in and "look around" it can sell them many things which catch their eye and fancy.

The electrical merchant should be able to entice women into his store to look over the new lines of household equipment.

One of the Mazda lamp manufacturers' pamphlets containing decorative lighting suggestions.

Santa Plays the Role of Electrical Iceman

A striking window used last year by the Frigidaire agency in San Francisco. The white refrigerator, tied with a bow of bright red ribbon, and the giant colored figure of Santa Claus carrying the icing on his shoulder, carried out the idea used in that company's advertising.

Nothing Very New But All Selling Ideas

Any number of selling ideas used by merchandisers of other lines are applicable to the selling of electrical Christmas gifts. A number have been treated here in detail. Many more can be suggested briefly in a few words.

Check these over and see if many of them will not help your own Christmas sales.

Electrical Toys are increasingly in demand by the modern youngest generation. Trains, power houses, engines, motors, transformers, radio parts, batteries, flashlights, toy ranges, irons, appliances—all sell well. Get people in the habit of getting everything electrical from your store.

Gift Certificates for those who want to give electrical presents but do not know what the recipient of the gift may already have in appliances. They bring people to your store after the holidays and often assist in selling more merchandise.

Attractive Packing. If it is a fact, and it is, that beautiful bottles sell ordinary perfume at extraordinary prices it is true that the offer to give special pains to the packing of Christmas purchases, expecially to delivering large appliances decorated for the occasion, will boost sales.

Christmas Eve Deliveries. If you can relieve your customers of the troublesome problem of keeping gifts in hiding until Christmas Eve by organizing to store purchases and guaranteeing to make deliveries on Christmas Eve or Christmas morning you will have done them a service which should bring them to your establishment again and often.

Use More Light. Successful merchandising concerns flood their places with light. They use colored lights, flashers, they decorate with light. As an electrical merchant a dose of your own medicine is convincing proof that you believe in it. Yours should be the brightest spot on the shopping row. Even if you are on a side street light will attract customers to you. Incidentally, you will sell more lighting equipment, too.

Merchants Charter Theater to Aid Shopping

IN MANY respects last year's co-operative Christmas venture of Long Beach, Calif., merchants was the most outstanding and successful affair ever attempted in southern California.

The innovation, styled "Kiddies Christmas Theater Parties," was inaugurated for the purpose of providing a suitable place for the mothers of the city to leave their children while they proceeded to do their Christmas shopping.

KIDDIES'
XMAS THEATRE
PARTY
AT 10 AM
EVERY MORNING
DEC. 20 to 24 Inclusive
COMPLIMENTARY TICKETS ARE BEING GIVEN TO PATRONS OF THIS STORE FOR THEIR CHILDREN BEGINNING MONDAY, DEC. 13TH AND EVERY DAY AS LONG AS OUR SUPPLY LASTS

Announcements used by all merchants in their advertising offering free kiddies' theater tickets.

There were 58 merchants participating in the plan, including the Lane Electric Company.

Because of the huge number to whom such a plan would be welcome at the holiday time, it was necessary that the merchants not only provide a mammoth place to leave the children, but also provide entertainment as well. The ordinary children's playrooms would not serve the purpose in this emergency.

Therefore, the co-operating merchants, through the local Chamber of Commerce, arranged with two local theaters for their play-houses during the hours from 10 to 12 each morning from Dec. 20 up until Christmas. Fifteen thousand tickets for the performances were subscribed by the various merchants at the cost price of 6 cents per ticket. The tickets were then distributed to the patrons of the various stores, beginning one week before the first theater party. Any child under 14 could use a ticket and the shows were open only to holders of such tickets. No purchases were necessary to obtain tickets.

Literally mobs of people stormed some of the stores where special desks had been arranged for the distribution of tickets. The early distribution of tickets served to bring many mothers down town at least a week earlier than they had planned, for most of them, because of the problem of finding means of being relieved of caring for their children, would otherwise delay until the last day.

At the theaters six nurses were in attendance during all of the "kiddie parties," while Santa Claus made a personal appearance also each day. Members of both the police and fire departments were assigned to duty at the theaters, assuring the utmost safety to the children.

Besides creating good-will among the mothers of the city, it made for leisurely, careful shopping that is expected to do away with much after-Christmas exchange work, always the bane of merchants' business lives. Likewise, it tended to more evenly distribute the shopping rush over several days.

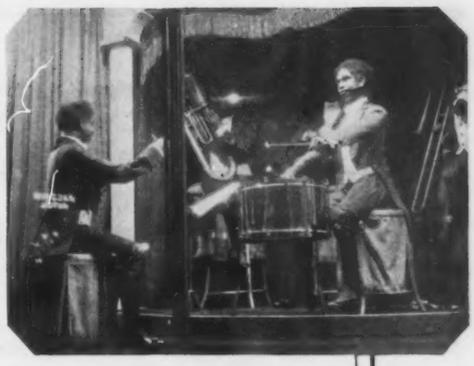
Small, hand-lettered, illustrated announcements, that stood out boldly, were furnished all participating merchants, and these were run in the regular store advertisements. These advertisements came in two sizes: 1-in., single column, and 2-in., single column. Window cards using similar announcements were used also to tie up individual stores with the venture.

A decorated tree always makes a window, the Whitney Electric Company of Colorado Springs found last year.

Five windows of a department store in San Francisco were devoted to the sale of lamps last year. This suggests that the lamp is a salable piece of holiday merchandise worth pushing.

Moving Windows Move Merchandise

WHO IS better equipped than the electrical contractor-dealer to use motion in his window displays? Large department stores find it increasingly profitable to have elaborate moving windows. This makes a good market for small motors, but unless the contractor-dealer himself uses some form of moving display that motor market is only half the battle. Some idea of the possibilities may be gained from the following descriptions.



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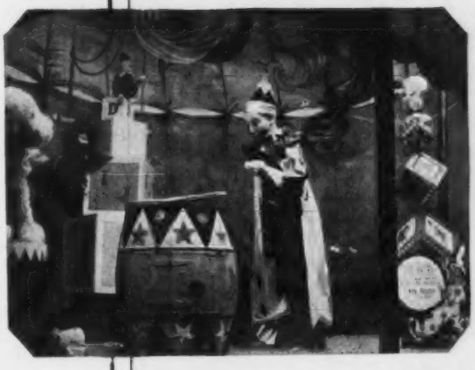


(3)

(4)

(1)
An orchestra in motion which blocked traffic at a busy street intersection.

(2)
Clown and moving seals.

(3)
A figure popped out of the barrel in this window.

(4)
Santas packing toys in a large case. A list of good children nearby.

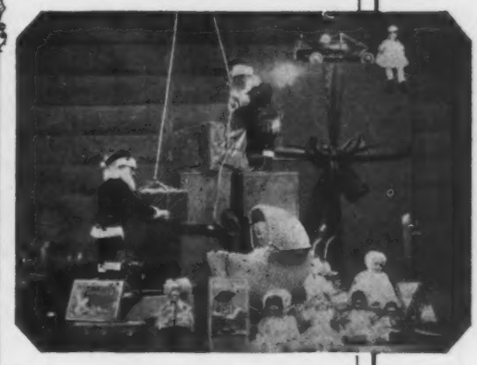
(5)
More packing operations in Toyland.

(6)
A dream of Christmas, children abed (right) and moving cut-out crossing floodlighted sky at the rear of the window.

(7)
Clown whirling on his arm.

Figures in the world's largest mechanical window display, 172 ft. long, at The Emporium, San Francisco, were fashioned of burlap, beaverboard and discarded paper towels. The towels were sized in glue, pasted over burlap and molded to shape. A few cog wheels, excentric cams, hidden belts to motors—and movement was imparted to the figures. One figure, that of Jack-the-Giant-Killer, was so cleverly arranged that he scowled, opened his mouth, and made as if to step from his chair after Jack.

Such displays draw crowds so large that extra police are often necessary to hold them back. Moving electric trains in windows, moving toys, or even automatons such as described, are equally attention-holding. One dealer in San Francisco, Louis Levy, having a moving dummy Santa Claus, employed a man to imitate the dummy in the other window. The crowds were kept guessing which was the dummy and which the real man.



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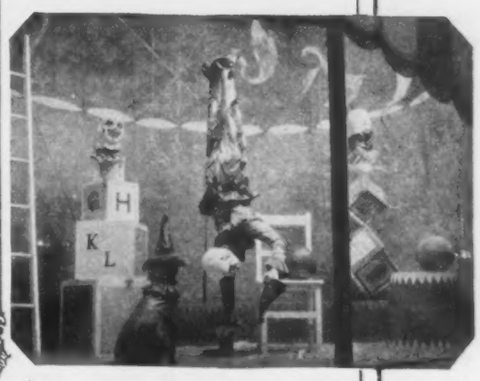
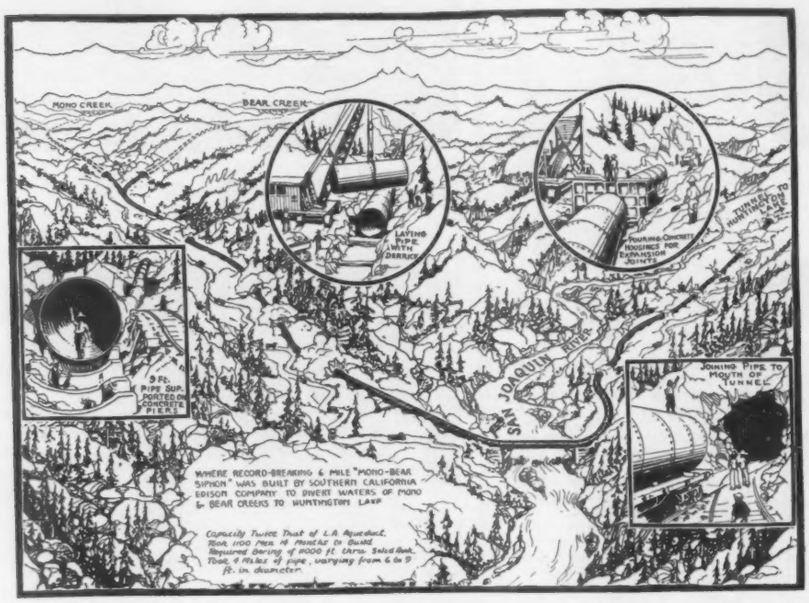


(7)

News of the Industry

Mono-Bear Diversion System on Big Creek Project Finished by Edison Company

BRINGING to a successful conclusion one of the most difficult pieces of engineering yet accomplished on its Big Creek-San Joaquin River hydroelectric project in the high Sierra of Fresno County, the Southern California Edison Company on Nov. 17 turned the water through the Mono-Bear diversion system, making 182,000 additional acre-ft. of water available for use through its entire series of five power plants. All this work has been under the direction of George C. Ward, vice-president in charge of operation and construction.


MONO CREEK
BEAR CREEK
LAYING PIPE WITH DERRICK
POURING CONCRETE HOUSINGS FOR EXPANSION JOINTS
TUNNEL TO HUNTINGTON LAKE
9 FT. PIPE SUPPORTED ON CONCRETE PIERS
JOINING PIPE TO MOUTH OF TUNNEL
SAN JOAQUIN RIVER
WHERE RECORD-BREAKING 6 MILE "MONO-BEAR SIPHON" WAS BUILT BY SOUTHERN CALIFORNIA EDISON COMPANY TO DIVERT WATERS OF MONO & BEAR CREEKS TO HUNTINGTON LAKE
Capacity Twice That of L.A. Aqueduct. Took 1100 men 18 months to Build. Required boring of 11000 ft. thru Solid Rock. Total, 6 Miles of pipe, varying from 6 to 9 ft. in diameter.

Artist's conception of the Mono-Bear diversion system of the Southern California Edison Company. This is the latest major development completed by the Edison company on its Big Creek-San Joaquin River hydroelectric project in the high Sierra in the northeastern part of Fresno County.

Mono and Bear Creeks are situated across a mountain ridge from the San Joaquin River. Through the construction of diversion dams on both Mono and Bear Creeks and the boring of two converging tunnels it has been possible to bring all of the water from these two streams to the head of a long inverted siphon, stretching across the bed of the south fork of the San Joaquin River, thence to the Florence Lake tunnel.

In planning for this great water reclamation project the company took into consideration the fact that it had but seven months each year in which to carry on the work, and all effort was used toward bringing the work to completion prior to Dec. 1, 1927. This work was carried on at an altitude of approximately 7,000 ft., and from the first of December to the end of May the climate is such as to prevent the carrying on of any outside work. Beginning with the opening up of the trails in the spring of 1926 a construction force, numbering at times in excess of 1,500 men, worked at top speed until forced out of this altitude by the early snow in the fall of 1926. In the spring of 1927, just as early as the weather would permit, this construction crew returned to complete the task before winter snows again repelled them, and succeeded in accomplishing their purpose.

More than 11,000 ft. of tunnel with a cross-section of 7 x 9 ft. was bored, and almost four miles of steel pipe was laid. This pipe varied in diameter from 6 ft. to 8 ft. To make possible the carrying of this pipe to its place on the line, it was necessary to construct more than eight miles of road through the most rugged type of mountainous country. Because of the uneven nature of the territory in which this work was being done, very little storage space was available in which to keep the pipe. It was therefore necessary literally to work from hand to mouth, and at no time was there more than a two or three days' supply of pipe on the ground at the siphon site. This meant that the transportation department, operating a great fleet of heavy-duty trucks hauling these great lengths of pipe into the mountains, had to function with the utmost efficiency, as any breakdown in that department might have delayed the completion date.

Colorado Company Voluntarily Reduces Lighting Rates

A reduction of approximately 20 per cent in lighting rates for Golden and Morrison, Colo., recently was voluntarily put into effect by the Colorado Central Power Company with the sanction of the Public Utilities Commission and the approval of the city council. The proposed rates retain the same minimum charge of $1.40 net for domestic use and $2.25 net for commercial use. The main difference between the old and new rate is in the discount feature. Heretofore discounts have been given on a sliding scale, although the scale was by no means uniform, while the new rate adopts a flat 10 per cent discount on all energy used for lighting purposes.

The basic charge for current for domestic use is set at 12 cents a kw-hr. for the first 100 kw-hr. and 9 cents a kw-hr. on all current used in excess of 100 kw-hr. The former rate was 15 cents a kw-hr.

In making public the announcement R. W. Booze, general manager, said in part: "It is the conviction of the company that greater use of our service by each consumer will be mutually beneficial to the consumer and the company. This reduction is made in the belief that increased sales, because of the lower cost, will result and will ultimately compensate for the marked decrease in revenue which the new rate will effect."

The Colorado Central Power Company which buys its power from the Public Service Company of Colorado, is the result of a recent merger of the Arapahoe Electric Light & Power Company of Englewood and Littleton, The Fort Lupton Power & Light Company of Fort Lupton and the Jefferson County Power and Light Company, Golden, under the ownership of the Electric Public Service Company of Chicago. E. A. Phinney, formerly president of the Jefferson County Company, is vice-president of the Colorado Central Company.

G. E. Co. Has Well Planned New Offices in San Francisco

On Oct. 31 the General Electric Company moved its San Francisco offices to the eighth floor of the Russ Building. These quarters now house, besides the main sales organization of the General Electric Company, the Edison Lamp Works, the International General Electric Company, the merchandise department of the General Electric Company, and the Pacific Coast Contract Purchase Corporation. The new premises have been carefully designed to meet the particular requirements of the General Electric Company to the end that more efficient operation may be effected.

An innovation in office building practice is the three lobby displays within glass enclosures. The first, the central station exhibit, shows an actual 3-panel switchboard installation with the various instruments and switches, as manufactured by the company for central-station requirements. This exhibit also includes a display of meter instruments and transformer products, and the latest types of ornamental street lighting units, street lighting transformers and control devices as well.

The second lobby display window features some of the motors and control devices manufactured by the company for industrial purposes. Various types of electrical ovens, water and space heaters also will be displayed, as well as glue pots and soldering irons. The arc welding exhibit will include a sample board showing the results obtained with automatic arc welding machines and the various types of welded joints.

The third lobby display is the Edison Lighting Institute, which is an elaborate lighting laboratory. There are only three or four similar lighting institutes in the United States, and the one of the General Electric Company in the Russ Building is the only one west of Chicago. Through the medium of this laboratory it will be possible to demonstrate the possibilities of artificial lighting as they apply to all phases of human activity. One of the most important features of this laboratory will be the model show window, representative of the most modern department store type and equipped for the producing of new, unusual and spectacular lighting effects. Intensities of illumination varying from dim moonlight to intense sunlight may be obtained by the pressing of a button, and color effects running the entire range of the spectrum may be secured in a similar manner.

Members of Water Commission Named by Mexico

Now that the President of Mexico has appointed the three commissioners to represent that republic on the International Water Commission, it seems probable that the first meeting will be held just as soon as Congress appropriates the expense money necessary, according to dispatches from Washington, D.C. As the funds probably will be carried in the deficiency bill, it is expected that the money will be available early in the session. The meeting probably will be held in January at El Paso.

The Mexican members have established their headquarters at Juarez, Chihuahua. The American members of the commission are: Dr. Elwood Mead, chairman, General Lansing H. Beach, and W. E. Anderson. The Mexican members are: Gustavo P. Serrano, Federico Ramos, and Janvier S. Mejorada.

Automatic Power Plant Planned for Lake Spaulding

Through contract between the Nevada Irrigation District and the Pacific Gas and Electric Company, additional water is to be passed through the Lake Spaulding reservoir. In order to utilize this water to the fullest advantage the Pacific Gas and Electric Company is re-

Architect's drawing of Spaulding 3 plant.

constructing its Spaulding 1 and 2 plants near Smart Station and will build a new power house on the rim of Lake Spaulding to be known as Spaulding 3.

The Spaulding 1 plant, built in a hole drilled out of solid granite on the almost perpendicular side of the Bear River Canyon a few hundred feet below the Lake Spaulding dam, is being rebuilt to include a 10,700-hp. unit. This unit utilizes the water discharged from Lake Spaulding through a pressure tunnel 8¾ ft. in diameter bored through solid rock. Spaulding 2 plant is situated on the canyon side about 150 ft. below the Spaulding 1 plant. Water carried through a pipe line to this plant operates a 5,000-hp. unit, which will be semi-automatic in operation.

The new Spaulding 3 plant will be erected on the rim of Lake Spaulding, 1½ miles from the No. 1 plant and will be operated entirely automatically from Spaulding 1, which will become the control or operating plant. To provide for additional facilities and the housing of switchboards and control apparatus, a two-story structure will be built on the face of the canyon, adjoining the present No. 1 plant. The No. 3 plant will have an installed capacity of 9,400 hp. with a turbine operating at a head of 319 ft., at a point where the Nevada Irrigation District's water will empty into Lake Spaulding reservoir.

Pasadena to Sell Lamps at Cost Despite Merchants' Protest

Despite the request of the Pasadena Merchants' Association that the Power and Light Department of the City of Pasadena refrain from the sale of electric lamps at cost price, the board of city directors has stated that it feels that it is expedient to continue the practice. The city light department for years has sold light bulbs at cost. The Merchants' Association, in its protest, declared that the sale of light globes is not a "proper governmental function" and that the city should discontinue what the association terms "the unfair and unprofitable practice of selling electric light bulbs." Considerable agitation was stirred up in the city by this move on the part of the Merchants' Association, and many protests against their request were made.

In commenting on the question at issue, Chairman Taylor of the board of directors, said:

> We realize the lamp situation is a mixed question. The merchants had a right to make their request, and in conjunction with the city manager the board discussed the matter and feels that it is best not to make a change. The service is maintained at the cost of the taxpayers. Out-of-town residents, however, have availed themselves to get Pasadenans to buy lamps for them. The city will take steps to guard against that practice and will limit the sale of lamps to Pasadenans. It is not right for us to furnish lamps in Santa Barbara and San Diego. The board has sought to get and meet the sentiment of Pasadenans and will therefore continue the practice of selling lamps, but will restrict the sale to Pasadenans.

Two Southern Utah Utilities to Interconnect Systems

Permission has been granted by the Public Utilities Commission of Utah to the Dixie Power Company and the Telluride Power Company, both operating in southern Utah, to interconnect their lines through the construction of a substation and a transmission line about 35 miles long.

As was pointed out in the petition filed with the commission, the Telluride Power Company serves the territory comprising all or parts of Garfield, Piute, Sevier, Sanpete, Millard and Beaver Counties, while the Dixie Power Company serves the territory comprising all or parts of Washington and Iron Counties. By the construction of the proposed substation and transmission line, the two systems can be operated so as to make it possible for either one to supply power to the other when it may have surplus power available, and when the demands on the other system are such as to require that additional service.

The two companies have entered into a contract for the financing and construction of the substation and line. The transmission line will extend from the Telluride company's lower Beaver station on the Beaver River, in Beaver County, to the northern terminus of the Dixie company's present transmission system at a point about three miles due west of Paragoonah, in Iron County.

New Rate Contract Cause of Dispute in Wallace, Idaho

The Public Utilities Commission of Idaho has been asked to restrain The Washington Water Power Company from enforcing against the Public Utilities Consolidated Corporation a new contract for the delivery of electrical energy, which the petition brands as illegal, unjust, unreasonable, unfair and discriminatory.

The Public Utilities Consolidated Corporation on Oct. 1 last came into possession of the properties of the Northwest Light & Water Company, which serves the city of Wallace, Idaho, with light and water. Because the hydroelectric energy generated by the local company is insufficient to supply the entire demand it has been buying its surplus power from The Washington Water Power Company under a contract which expired Sept. 1 last. The contract to which the Wallace concern objects is the one which The Washington Water Power Company seeks to enforce in place of the old one.

The new contract, the petition sets forth, sets up a rate of $3.50 per horsepower of maximum demand each month, except that in no event shall the net cost per kw-hr. be less than 12 mills per kw-hr. The minimum monthly demand, this new contract provides, shall never be less than 75 per cent of the highest monthly demand previously recorded; it defines the term maximum demand as that 5-minute peak load whose average value is the highest.

Representatives of the city of Wallace and of the Public Utilities Consolidated Corporation contend that in case at any time there should be a cessation of the production of energy at the Wallace plant the corporation and the consumers of Wallace would be compelled to pay at the rate of 75 per cent of this maximum load until a new peak was established, making it evident that an increase in local rates would be necessary under this proposed contract.

The rates of the former contract, the petition says, have been in force for nearly ten years, and the contract has been filed with the commission as a schedule of rates; further that the proposed alteration of this contract is in violation of the Idaho compiled statutes of 1919, since the defendant has made no showing before the commission and has made no attempt to obtain a finding that such increase in rates is justified.

Organizer of Educational Course Wins McGraw Jobbers Medal

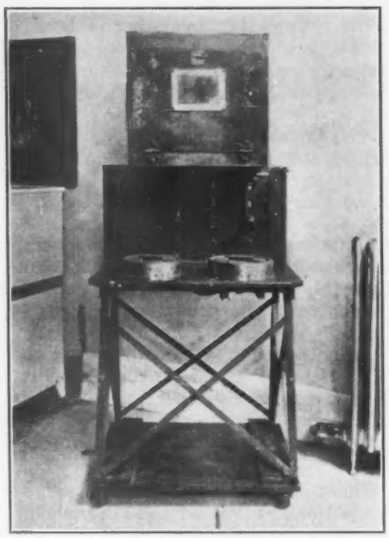
The Jobbers Medal and purse for 1927 given under the James H. McGraw Award was presented at the winter meeting of the Electrical Supply Jobbers' Association in Detroit to O. F. Rost, president, Newark Electrical Supply Company, Newark, N.J. The award was made in recognition of his constructive contribution to the advancement of the jobbing branch of the electrical industry through the organization and operation of a correspondence course for the education of jobbers' salesmen in the fundamentals of the electrical trade that they might advise and assist their contractor-dealer customers more intelligently.

The committee of judges which awarded the medal to Mr. Rost consisted of George E. Cullinan, F. R. Price, H. M. Gansman and George L. Patterson. The committee of awards consists of W. W. Freeman, H. B. Crouse, W. E. Robertson, L. K. Comstock, F. M. Feiker and Earl Whitehorne.

Japan Has Power Association.—The organization of the Nippon Power Association, which was established in July, was stimulated by the World Power Conference, according to a recent issue of Denkinotomo. This was due to the fact that Japan, having no power association at that time, was obliged to send delegates from other organizations such as the mechanical or electrical engineering societies.

On the Mayflower—Almost

One of the first electric ranges ever built is this Hotpoint range built in 1904 in the plant at Ontario, Calif. The cooking surface and the back wall of this range are made of marble. To obtain three-heat switches it was necessary to use the three holes with a plug.



These holes may be seen on the marble back, one set of three holes and a plug for each element of the range. The oven had two units and was insulated with two inches of magnesia insulation, which was the best heat insulator available in those early days. This range was in actual use for nineteen years. The oven had a glass window in the door which permitted the inspection of the contents without the necessity of opening the door.

Extension of Hetch Hetchy Line Defeated at Election

At the municipal election held in San Francisco Nov. 8, a proposed $2,000,000 bond issue for the purpose of completing the city's transmission line between Newark and San Francisco failed to receive the necessary two-thirds majority of the votes cast. The vote stood: yes—57,607, no—55,940.

At present the line brings the power from the city's Moccasin plant of the Hetch Hetchy project to the Newark substation of the Pacific Gas and Electric Company, which buys the plant's output at approximately $2,000,000 a year. Advocates of municipal ownership have sought to have the present transmission line extended to the city, a distance of 35 miles, in anticipation of the time when the people of San Francisco might institute condemnation proceedings and vote bonds for the acquisition of either or both of the distribution systems of the Pacific Gas and Electric Company and the Great Western Power Company now being evaluated for the city by the California Railroad Commission.

At the same election a $4,600,000 bond issue for municipal railway extensions was defeated, while a $9,000,000 bond issue for boulevards was approved.

Hama Hama River in Washington Site of New Power Plant

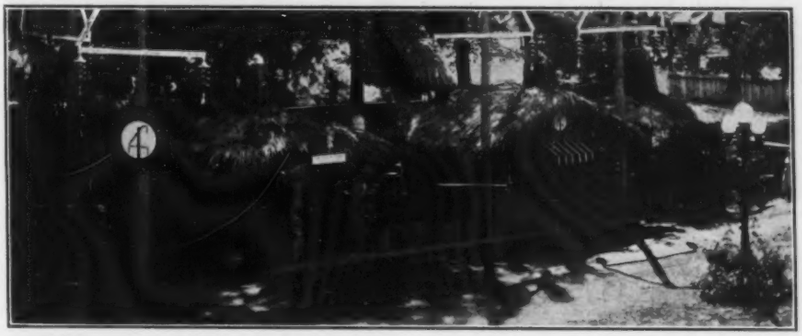
Permits granting the right to appropriate 350 sec-ft. of water from the Hama Hama River and to store 15,800 acre-ft. have been issued by R. E. Tiffany, hydraulic supervisor for the state of Washington, to the Hama Hama Power & Paper Company, Olympia, Wash. The company plans to erect a power plant on the Hama Hama River just above Hoods Canal, an arm of Puget Sound, in the west central part of Mason County. The plant, estimated to cost $1,500,000, is planned to develop 19,000 hp. Work is to be started within two years.

First filing on this site was placed with the hydraulics office Nov. 28, 1921, but after several transfers of the application, it recently has been assigned to the Olympia firm.

Los Angeles Power Bureau Opens Two New Substations.—Two new substations with a total capacity of 300,000 hp. were placed in operation recently by the Bureau of Power and Light of Los Angeles. One of these is at Ninety-fifth Street and Central Avenue, and the other is in Wilmington. It is planned, according to E. F. Scattergood, chief electrical engineer for the bureau, to construct eventually a 60-kv. belt line completely surrounding Los Angeles. These two substations form the first units in this proposed system. The new Central Avenue station, known as Station B, cost in excess of $1,500,000, while Station C at Wilmington cost $750,000.

Three Central Stations Take Part in Local Fairs

At the left is an exhibit placed in the Ventura County Fair by the Southern California Edison Company. The company, appreciating the value of these local exhibits, makes use of them throughout its system. The background is a standard set-up made by the company and is transported from fair to fair. Made up in sections, it permits of considerable variation, making it possible to fit into practically any space which may be available. At the right is shown part of the exhibit made by the company at the Tulare County Fair.



For the third year the San Joaquin Light & Power Corporation has conducted its Tea Garden at the Fresno District Fair. An increase in the number of visitors to the booth was shown by the number of cups of tea served, 6,840 having been served this year as against 5,320 last year. A Boy Scout troup stationed at the booth acted as messengers between the Fair administration building and anyone on the grounds wanted on the telephone or for other calls. The Boy Scouts also conducted the only parcel checking stand on the grounds. No charge was made for any service.

This exhibit by the Utah Power & Light Company at the recent Utah State Fair captured first prize. This is the second consecutive time that company has taken first prize with its Utah State Fair exhibit.

This year's exhibit conveyed the message of better lighting, both in the home and as a true measure of progress in the community. A strikingly effective panoramic view of Salt Lake City's business district, with the residence district in the background and the State Capitol in the foreground, was shown, with attractive lighting effects; and the idea of better lighting in the home was shown by contrasting two fixtures in another part of the booth. The exhibit drew much attention and favorable comment for its novel arrangement.

Comprehensive Lighting Course at Stanford University

The co-operative effort of the Engineering Department at Stanford University, the junior and senior electrical and mechanical engineering students, and the Edison Lamp Works of the General Electric Company have made possible an illumination course at that university. The course is being given by L. G. Gianini, lighting specialist of the Edison Lamp Works, which volunteered to carry on the work only because it felt that the subject matter would be of value and interest to the students.

Briefly, the course embraces the following subjects: an introduction showing the need and desirability of such a course; a brief history of illuminants and the art of illumination and of the development of the modern incandescent lamp; the theory and characteristics of the Mazda lamp; the manufacture of the incandescent lamp of today; illumination terms and concepts; the calculation of a lighting installation in which are presented the essential data applying to all forms of lighting installations; reflectors for incandescent lamps; specific lighting problems; discussions of specific problems involved in street lighting with incandescent lamps; floodlighting; airport lighting.

Many actual working demonstrations of lighting equipment utilizing incandescent lamps are given during the course, which in its entirety embraces far more ground than the title would suggest.

New Company Formed to Publish Four Industrial Papers

Incorporation of a subsidiary, the McGraw-Shaw Company, for the purpose of publishing four long-established industrial publications has been announced by the McGraw-Hill Publishing Company, Inc., of New York and the A. W. Shaw Company of Chicago. The papers affected are Factory, Industrial Management, Industry Illustrated and Industrial Engineering. Under the announced publishing plan the first two papers will be combined as Factory and Industrial Management, starting with the January issue. The third paper will be consolidated with Industrial Engineering, a McGraw-Hill publication established in 1882, starting with the December issue.

In a statement of the facts underlying the formation of the subsidiary, James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., stressed the fact that the arrangement by which the two parent companies control jointly this subsidiary is in no sense or degree a merger of the McGraw-Hill and Shaw groups of journals, and that the two companies have effected a separate subsidiary organization in order to render more adequate service in a publishing way to those manufacturers whose marketing problems extend throughout the range of industry.

Negotiations Under Way to Settle Edison-Herminghaus Suit

Negotiations are under way for a settlement out of court of the Southern California Edison Company condemnation suit against the Herminghaus estate, according to a statement made recently by Edward F. Treadwell, chief counsel for the Edison company in this case.

The action pending in the supreme court at this time is one in which the Edison company sought to condemn the Herminghaus lands as a means of obtaining the necessary water to operate hydroelectric plants on the Big Creek project in the high Sierra east of Fresno. This condemnation suit is the aftermath of the decision rendered in the lower court in which the Edison company was restrained from interfering with the natural flow of the San Joaquin River by impounding water which, the court held, would interfere with the riparian rights of the Herminghaus heirs to an unrestricted flow of the San Joaquin River past their lands in Fresno and Madera Counties.

The United States Supreme Court subsequently dismissed an appeal of the Edison company for writ of review of the findings of the California courts (Electrical West, November, 1927), thereby making the injunction permanently binding upon the power corporation. The present action seeks to condemn the Herminghaus holdings under right of eminent domain. The lands affected by the proceedings are said to have a value in excess of two million dollars.

Report of the decision of the California superior court was published in the Journal of Electricity, March 1, 1925; that of the supreme court's decision in Electrical West for January, 1927, p. 47; and a review of that decision in its issue for February, 1927, on p. 87.

To Develop New Business Edison Company Budgets Big Sum

Of the Southern California Edison Company's 1928 budget of $31,850,000 a sum of $16,950,000 has been set aside for the development of new business and the construction of new distribution lines and substations, according to R. H. Ballard, vice-president and general manager of the company. Of the balance, $5,712,000 is to be expended at Long Beach steam plant where the first of eight new 125,000-hp. units will be brought to completion. On the hydroelectric construction work in the high Sierra a sum of $5,892,000 will be expended. In his statement Mr. Ballard said in part:

> The spending of such a large portion of the budget for new business activities marks a new era in the history of the Southern California Edison Company. Heretofore the work of developing new sources of electric energy, both hydro and steam power, has required the major portion of the budget figure. We have reached the point in our construction history where we are able to bring on to our lines large blocks of power at very short notice. . . . . All of our attention for the next few years must be concentrated upon the problem of developing new demands for the energy which we have ready for use. . . . . Our task is not to find new customers, but to demonstrate to our present customers that they can profitably take advantage of electric service to a far greater extent than at present. As evidence of the scope of our progress we intend to market 5,000 electric ranges during the coming year. Other appliances will be sold in proportion.

McNary-Sinnott Bill to Urge Development of Umatilla Rapids Project

DEVELOPMENT of the Umatilla Rapids project on the Columbia River by the federal government will be urged before the next Congress through the McNary-Sinnott Bill, which will be supported and pressed by a committee of Oregon citizens which were appointed from the Umatilla Rapids Association at its annual meeting in Pendleton, Ore., Oct. 27. The Umatilla Rapids project, as contemplated in the bill, provides for canalization of the river at the rapids making navigation possible as far as the mouth of the Snake River, the reclamation of a vast acreage of arid land, and the ultimate development of 420,000 hp. of electrical energy.

The terms of the bill provide for the construction of the project on the unit basis and authorizes an initial bond issue of $45,000,000 to be paid for out of the sale of electrical energy. It was pointed out at the association meeting that, should the bill pass and the proect be started in 1928, it would be 1937 before any power would be available and that this first unit would be limited to 31,000 hp. Twenty years would be required to complete the entire development, and reports presented to the association indicated that by that time the needs of various communities within transmission distance of the site would be more than sufficient to absorb the entire output of energy. The intention of the proponents of the project is that the government should sell the energy to existing power companies and to municipalities at the bus bars of the generating station where, it is contended, the generating cost will be extremely low in comparison to other hydroelectric developments.

Officers of the Umatilla Rapids Association elected at the meeting are: president—Marshall Dana, Portland; chairman of Executive Committee—J. N. Teal, Portland; vice-presidents—M. A. Means, Lewiston, Idaho; William Warner, Alderdale, Wash; George A. Hartman and George Baer, both of Pendleton. The committee chosen to present a brief in favor of the measure before committees of the Senate and House in Washington in January consists of Messrs. Teal, Dana, Baer and E. B. Aldrich.

Northwest Utility Lauds Loyalty of Employees in Booklet

As a step toward eradicating the erroneous conception held by the public that a public service corporation is an inanimate entity, the Pacific Power & Light Company, Portland, recently has issued a booklet called "Personalities—A Story of Loyalty and Service," and sent a copy to each customer and stockholder. The booklet is made up primarily of the photographs, captioned by their names and jobs or positions, of all the men and women that have been with the company ten years or more. A foreword by Guy W. Talbot, president, referring to the seventeen years of public service rendered by the company and directing attention to the extent to which the human element controls the destiny of business, serves to introduce the pictorial pages.

The following six men are listed as "25-year employees" of the company or its predecessors: F. W. Vincent, district manager, Pendleton, Ore., (38 years); M. F. Coberth, substation operator, The Dalles, Ore.; R. E. Fewell, operator powerdale plant, Hood River, Ore.; Julius Olsen, substation operator, Astoria, Ore.; Louis Happy, construction foreman, Kennewick, Wash.; and W. H. Whitlow, meter reader, Yakima, Wash. There follow the photographs of fourteen 20-year employees, thirty-three 15-year employees and thirty-five 10-year employees.

The booklet is attractively prepared and is in accord with the public relations program of the company, whose institutional advertising has striven consistently to visualize the company to its customers as a living entity and a moving factor in the life of the communities it serves. This idea is embodied in the words of the foreword.

Brawley, Calif., to Investigate Municipal Steam Plant Cost

The City Council of Brawley, Calif., has passed a resolution authorizing the city engineer to investigate the costs and possible revenues from a city-owned steam generating plant. It was the consensus of opinion at the council meeting that electricity could be generated at less than 1 cent a kw-hr. in such a steam plant.

Brawley is a city of approximately 6,000 population situated in the northern end of the Imperial Valley. It is served at the present time by The Southern Sierras Power Company, which has slightly more than 1,500 meters in Brawley and its immediate environs.

A.I.E.E. and Italy-America Society Honor Volta

In honor of the memory of Alessandro Volta, noted Italian scientist, the one hundredth anniversary of whose death occurred Nov. 4, a joint meeting of the San Francisco Section of the American Institute of Electrical En-

gineers and the Italy-America Society was held on that date at the Engineers' Club, San Francisco.

The speakers on the program included Sylvester Andriano, attorney, who spoke on "The Life of Volta, the Man;" Prof. C. L. Cory of the University of California whose subject was "Volta, the Scientist;" and Prof. Robert E. Swain of Stanford University, who spoke on "The Effect of the Scientific Research of Volta." T. A. Rickard, consulting editor, Engineering and Mining Journal, was master of ceremonies.

Volta's greatest contribution to science, it was agreed, was his invention of the "galvanic pile," which gave to civilization the electric current in every-day life.

Pacific Coast Electrical Association

Charges of Conceit and Ignorance Brought Against Central-Station Selling

INDICTED as "too cocky, too conceited and too ignorant" in its electrical merchandising, the electrical industry was treated to as rough-and tumble a session as the frank and outspoken Richard Neustadt, managing director, Retail Merchants Association of San Francisco, alone could be expected to give it at the second commercial section conclave, Friday afternoon, Nov. 18. Mr. Neustadt opened the last "quarter" of a "football" program, to carry out the figure of speech, with a straight drive through the line and left the field strewn with the remains of central-station smugness and complacency as respects selling activity.

Charging cockiness in their attitude toward small merchants and merchandising because of an engineering and financial frame of mind; conceit because, when finally undertaken, merchandising was conducted as if appliances must sell "just because you have kilowatt-hours to dispose of and people owe it to you to take them"; and ignorance because central-station merchandising in most cases has been undertaken with utter disregard for and in ignorance of the fundamentally basic principles of merchandising, Mr. Neustadt administered a shake-up to the 150 commercial men present reminiscent of a similar "fire" of some twenty years ago in San Francisco.

The pitfalls of "volume" at low margin, leading into mathematical entanglements, and the snares of unwise credit extension were two dangers elecerical merchandisers had disregarded, he charged. Experienced credit men had determined that credit should be extended only upon a basis of one-third down, a year or less to pay up, and at no time a greater amount outstanding than the depreciated value of the article. This principle had been particularly disregarded, he said.

"The problem is unique only because of your attitude toward it," he declared. "Nobody is really selling electrical appliances, not even the electrical industry." He warned that unless all outlets for merchandising were developed electrical appliances would be left out of the picture because other lines of merchandisers were telling a more convincing story.

"If you could get a monopoly on electrical appliances—and you can—you won't sell half the number of appliances you do today. You can freeze out the small merchant and have a monopoly but it won't do you any good. You will have to take in the Electragist, the small merchant, the department store and every possible outlet and have them working for you. Bring them into the game. I'm not preaching co-operation —but it's true."

Clotilde Grunsky, Pacific Coast editor, Electrical Merchandising, in her talk on the women's viewpoint in merchandising was no less direct in her statements. She criticized advertising designed to reach the housewife, urged less sentiment and fancy writing, and maintained that the housewife was truly interested in the technical side of her profession, namely, keeping house. It was her job and the technical part of her activities but she could not get sentimental over it.

Radio, in Miss Grunsky's opinion, had been overlooked as a means of carrying truly worthwhile information to the housewife.

She ended by relating a number of "don'ts" for selling to the housewife, maintaining that the salesmen on regular rounds with whom the housewife could become acquainted and learn to trust, was the most favored in door-to-door purchases.

Lewis A. McArthur, vice-president and general manager, Pacific Power & Light Company, Portland, was just as outspoken in urging that the wives of the men employed by a utility be considered as much on the payroll of the company as their husbands. "If they don't know it they ought to," he decleared and described the efforts of his company to keep the women as well as the men thoroughly "sold" on the company. At the executive meetings of his company the wives of the district managers are required to be present in order that they also may be synchronized with company policies.

A recent survey showed that the 76 per cent of that company's employees who owned their own homes also owned ranges. The average consumption per year for employees is 1,400 kw-hr., exclusive of water heating. Such employees, he declared, could sell electrical service to their neighbors convincingly.

Mr. McArthur, in closing, urged that to bring back the American home as a genuine influence electricity should be made to play a more important part. "If we divorce from the home all the activities and interests which normally belong there, all the manufacturing processes which go into the preparation of food and the maintenance of the home, naturally we drive our children away from it."

In the absence of Mr. McWhinney the "fourth quarter" was presided over by Al Joy on behalf of the Advertising-Publicity Section, with whom the last session was held jointly.

The meeting of the section Thursday was opened by W. L. Frost, president of the association, who emphasized the need for commercial development. He advocated a possible goal of 600 kw-hr. per year per domestic consumer as one for the central stations in the state to set. He urged that the industry develop an "electrical consciousness" and offered the suggestion that this can be done only by greater use of appliances by the individuals in the industry.

Attendance at the various committee meetings indicated that good progress is being made in the work outlined for the year. The Lighting Educational Committee reported that during November an average of two talks a day before women's clubs and parent-teachers' associations was made by a corps of fifteen speakers on the subject, "Conservation of Vision." The Street and Highway Lighting Committee is making a revision of street-lighting standards to comply with developments during the past three years. The Lighting Campaign Committee is studying successful lighting campaigns conducted by different central stations, while the Commercial Lighting Committee has completed plans for staging lighting displays in four California cities. The Sign and Flood Lighting Committee is making a study of recent sign developments, particularly the neon signs.

The Agricultural Power Committee is preparing copy for a manual devoted to agricultural applications of electricity. The Competitive Power Committee is gathering engineering data to be used in selling central station service to replace power generated by isolated plants, and is making a study of oil field electrification. The Industrial Power Committee is compiling cost data on existing industrial heating installations and has prepared an illustrated lecture on this subject.

The Merchandising Committee is studying methods for improving trade relations and has formed committees representing all groups dealing in electrical merchandise for the purpose of discussing mutual problems. The Air

Heating Committee is making a study of electric heating for schools while the Commercial Cooking Committee is preparing a booklet of consumer testimontials on electric cooking installations. The Electric Range Committee, co-operating with both the Electragists and the city inspectors, is drafting a set of specifications in accordance with the National Code that will permit the installation of a range in incorporated cities for approximately $50. This committee also is organizing a speakers' bureau to give further publicity to the Red Seal Plan. Another of the committee's activities is the plan to hold an electric range campaign among all power company employees in the state during the month of February. The Customer Relations Committee has completed plans for an essay contest similar to that held in 1926 and 1927.

The next meeting of the section will be held in Fresno during March.

Annual Convention to Be Held in Pasadena June 12-15

Following the announcement that the Atlantic City convention of the N.E.L.A. had been set for June 4-8, 1928, it was decided by the Executive Committee of the P.C.E.A. that that association's convention would be held June 12-15, 1928, at the Hotel Huntington, Pasadena.

Richard E. Smith, advertising manager, Southern California Edison Company, and last year chairman of the Advertising-Publicity Section, was named as general convention chairman, and "Load-Building" chosen as the theme around which the program should be planned.

A committee consisting of Paul M. Downing, vice-president in charge of electrical operation and construction, Pacific Gas and Electric Company, N. R. Sutherland, treasurer of the association, and Samuel H. Taylor, secretary, was named to go into the matter of extending to notable professors and educators invitations to honorary membership in the association in order to coordinate the work of educational institutions and of the electrical industry.

Sam E. Gates, district manager, General Electric Company, Los Angeles, was made vice-chairman of the Membership Committee for southern California, whose special duties would be to bring into the membership people in branches of the electrical industry other than central stations.

Engineering Section to Hold Group Meetings.—Headquarters for the group meetings of the Engineering Section, P. C. E. A., which are to be held January 11-13, 1928, will be in the Clift Hotel, San Francisco.

Northwest Electric Light & Power Association

Annual Convention Will Be Held in Portland June 19-22

Next year's annual convention of the Northwest Electric Light and Power Association is to be held in Portland, June 19-22, 1928, according to announcement of the president, A. C. McMicken, general sales manager, Portland Electric Power Company, Portland.

In accordance with the custom of the past few years the dates were chosen with regard to the conventions of the N.E.L.A. and the P.C.E.A., being two weeks after the national convention and the week following the P.C.E.A. convention, so that national officers and others desiring to visit both far Western conventions may do so in one two-weeks' trip.

Engineering Section to Hold Fifth Annual Meeting.—The fifth annual general meeting of the Engineering Section of the Northwest Electric Light and Power Association will be held in Spokane March 8-9, 1928. The place and dates were set at a meeting of the executive committee of the section at Seattle last month. The program will follow the same general plan as in previous years when each committee has been allotted a time on the program to present matters pertinent to its studies, though in general an attempt will be made at the next meeting to cut down the number and length of formal papers to allow more time for informal discussion.

Personnel for 1927-1928

EXECUTIVE COMMITTEE

A. C. McMicken, Portland Elec. Pwr. Co., president.
R. M. Boykin, Puget Sound Pwr. & Lt. Co., vice-president at large.
R. B. King, Idaho Pwr. Co., vice-president for Idaho.
W. B. McDonald, Mount. States Pwr. Co., vice-president for Montana.
Z. E. Merrill, Mount. States Pwr. Co., vice-president for Oregon.
P. M. Parry, Utah Pwr. & Lt. Co., vice-president for Utah.
L. A. Lewis, Wash. Water Pwr. Co., vice-president for Washington.
F. W. Brownell, Puget Sound Pwr. & Lt. Co.
J. I. Colwell, Graybar Elect. Co.
D. C. Green, Utah Pwr. & Lt. Co.
O. L. LeFever, Northwestern Elect. Co.
J. P. Lottridge, East Ore. Lt. & Pwr. Co.
A. S. Moody, G. E. Co.
G. L. Myers, Pacific Pwr. & Lt. Co.
J. C. Plankinton, Northwestern Elect. Co.

OTHER OFFICERS

A. J. Johnstone, Portland Elect. Pwr. Co., treasurer.
B. H. Snow, "Eelectrical West," secretary.
W. E. Hudleson, Portland Elect. Pwr. Co., assistant to president.

ACCOUNTING SECTION

EXECUTIVE COMMITTEE

F. W. Brownell, Puget Sound Pwr. & Lt. Co., chairman.
A. E. Janssen, Idaho Pwr. Co., vice-chairman.
W. L. Fitzpatrick, Mount. States Pwr. Co.
A. J. Johnstone, Portland Elect. Pwr. Co.
R. H. Jones, Utah Pwr. & Lt. Co.
D. F. McCurrach, Northwestern Elect. Co.
W. F. Miller, Wash. Water Pwr. Co.
J. A. Rockwood, Portland Elect. Pwr. Co.
D. J. Torrance, Puget Sound Pwr. & Lt. Co.
M. J. Wilkinson, Pacific Pwr. & Lt. Co.

CLASSIFICATION OF ACCOUNTS COMMITTEE

W. F. Miller, Wash. Water Pwr. Co., chairman.
G. H. Pike, Wash. Water Pwr. Co., vice-chairman.
D. F. McCurrach, Northwestern Elect. Co.
W. T. Neill, Pacific Pwr. & Lt. Co.
S. E. Ratcliffe, Puget Sound Pwr. & Lt. Co.

CUSTOMERS' RECORDS COMMITTEE

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B. H. Parkinson, Pacific Pwr. & Lt. Co., vice-chairman.
E. T. Donnegan, Puget Sound Pwr. & Lt. Co.
N. B. Whittier, Portland Elect. Pwr. Co.

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L. E. Hinman, Portland Elect. Pwr. Co., vice-chairman.
C. E. Gieseker, Wash. Water Pwr. Co.
E. C. Winslow, Pacific Pwr. & Lt. Co.

GENERAL RECORDS COMMITTEE

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E. I. Snyder, Portland Elect. Pwr. Co., vice-chairman.
J. G. Hawkins, Northwestern Elect. Co.
C. F. Kirchaine, Puget Sound Pwr. & Lt. Co.
G. F. Mackenzie, Pacific Pwr. & Lt. Co.

PURCHASING AND STOREROOM COMMITTEE

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A. D. Smith, Utah Pwr. & Lt. Co., vice-chairman.
V. L. Halliday, Utah Lt. & Traction Co.
H. Mann, Utah Pwr. & Lt. Co.
R. W. Miller, Idaho Pwr. Co.

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B. Gadeholt, Northwestern Elect. Co., vice-chairman.
C. R. Groth, Pacific Pwr. & Lt. Co.
L. G. Park, Portland Elect. Pwr. Co.
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COMMERCIAL SECTION

EXECUTIVE COMMITTEE

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E. E. Scofield, Wash. Water Pwr. Co.
J. L. White, Portland Elect. Pwr. Co.
(Others to be appointed.)

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A. B. Chambers, Portland Elect. Pwr. Co.
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C. L. Weaver, Westinghouse E. & M. Co.

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(Chairman not yet appointed.)

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L. W. Brainerd, Idaho Pwr. Co.
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R. W. Clark, Puget Sound Pwr. & Lt. Co.
V. H. Moon, Pacific Pwr. & Lt. Co.
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DOMESTIC ELECTRIC REFRIGERATION COMMITTEE

H. M. Ferguson, Utah Pwr. & Lt. Co., chairman.
(Personnel not yet announced.)

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(Chairman not yet appointed.)

GENERAL MERCHANDISING COMMITTEE

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G. L. Jackson, Mount. States Pwr. Co.
R. B. McElroy, Wash. Water Pwr. Co.
J. L. White, Portland Elect. Pwr. Co.

HOME AND INDUSTRIAL LIGHTING COMMITTEE

Fred Zaugg, Northwestern Elect. Co., chairman.

Club Contact Subcommittee

Albany: G. L. Jackson, Mount. States Pwr. Co.
Boise: L. W. Brainerd, Idaho Pwr. Co.
Everett: Geo. Newell, Puget Sound Pwr. & Lt. Co.
Portland: G. E. Sullivan, Portland Elect. Pwr. Co.
Salem: W. M. Hamilton, Portland Elect. Pwr. Co.
Salt Lake: R. M. Bleak, Utah Pwr. & Lt. Co.
Seattle: R. M. Boykin, Puget Sound Pwr. & Lt. Co.
Spokane: J. E. E. Royer, Wash. Water Pwr. Co.
Walla Walla: R. B. Bragg, Pacific Pwr. & Lt. Co.
Yakima: B. P. Bailey, Pacific Pwr. & Lt. Co.

Speakers' Subcommittee

Boise: Geo. Kincaid, Idaho Pwr. Co.
Portland: Al. Bergeron, Miller Co.; A. M. McMillen, Graybar Elect. Co.; Walter Potter, Nat. Lamp Works.
Salt Lake: K. W. Browning, Utah Pwr. & Lt. Co.; Elmer Johnson, Capital Elect. Co.
Seattle: L. E. Karrer, Puget Sound Pwr. & Lt. Co.; J. Kelly, Graybar Elect. Co.
Spokane: L. K. Snyder, Wash. Water Pwr. Co.

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Geo. Hibbert, Pacific Pwr. & Lt. Co.
H. G. Kelsey, Grays Harbor Ry. & Lt. Co.
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E. H. Collins, Wash. Water Pwr. Co.
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H. H. Schoolfield, Pacific Pwr. & Lt. Co.
C. C. Simeral, Portland Elect. Pwr. Co.
R. E. Thatcher, Puget Sound. Pwr. & Lt. Co.
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W. J. Mandley, Mount. States Pwr. Co.
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John Bankus, Portland Elect. Pwr. Co.
D. L. Brundige, Utah Pwr. & Lt. Co.
Jos. Hellenthal, Puget Sound Pwr. & Lt. Co.
W. S. Hill, Grays Harbor Ry. & Lt. Co.
C. S. Knowles, Pacific Pwr. & Lt. Co.
Frank Lewis, Northwestern Elect. Co.
Geo. McClellan, Mount. States Pwr. Co.
D. R. McClung, Pacific Pwr. & Lt. Co.
R. McKay, Wash. Water Pwr. Co.
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R. S. Daniels, Calif. Ore. Pwr. Co.
C. P. Dunn, Portland Elect. Pwr. Co.
J. A. Hale, Utah Pwr. & Lt. Co.
G. C. Sears, Puget Sound Pwr. & Lt. Co.
H. L. Senger, Idaho Pwr. Co.
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J. B. Fisken, Wash. Water Pwr. Co.
H. J. Flagg, Grays Harbor Ry. & Lt. Co.
C. R. Higson, Utah Pwr. & Lt. Co.
L. H. Kistler, Northwestern Elect. Co.
T. W. Maclean, Wash. Water Pwr. Co.
H. H. Schoolfield, Pacific Pwr. & Lt. Co.
E. L. White, Puget Sound Pwr. & Lt. Co.
Ellis Van Atta, Pacific Pwr. & Lt. Co.

METER COMMITTEE

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A. J. Gravelle, Grays Harbor Ry. & Lt. Co.
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A. H. Kreul, Portland Elect. Pwr. Co.
C. R. McLean, Mount. States Pwr. Co.
W. J. McMinn, Utah Pwr. & Lt. Co.
L. D. Snow, Puget Sound Pwr. & Lt. Co.
Howard Waterman, Idaho Pwr. Co.

OVERHEAD SYSTEMS COMMITTEE

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P. P. Ashworth, Utah Pwr. & Lt. Co.
Harry Billica, Graybar Elect. Co.
J. B. Brokaw, East. Ore. Lt. & Pwr. Co.
M. T. Crawford, Puget Sound Pwr. & Lt. Co.
R. J. Davidson, Pacific Pwr. & Lt. Co.
L. R. Gamble, Wash. Water Pwr. Co.
Curtis Hill, Puget Sound Pwr. & Lt. Co.
D. A. Hord, Northwestern Elect. Co.
H. M. Jones, Idaho Pwr. Co.
F. O. McMillan, Ore. State College.
F. J. Robbins, Grays Harbor Ry. & Lt. Co.
Walter Smith, Mount. States Pwr. Co.
H. R. Wakeman, Portland Elect. Pwr. Co.
C. D. Wood, Calif. Ore. Pwr. Co.

Line Loading and Strength of Aerial Lines Subcommittee

H. H. Schoolfield, Pacific Pwr. & Lt. Co., chairman.
P. P. Ashworth, Utah Pwr. & Lt. Co.
M. T. Crawford, Puget Sound Pwr. & Lt. Co.
R. J. Davidson, Pacific Pwr. & Lt. Co.
L. R. Gamble, Wash. Water Pwr. Co.
D. A. Hord, Northwestern Elect. Co.
Frank New, Portland Elect. Pwr. Co.
T. A. Purton, Idaho Pwr. Co.

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H. S. Bastian, C. C. Moore & Co. Engineers.
W. Brenton, Portland Elect. Pwr. Co.
J. A. Hale, Utah Pwr. & Lt. Co.
W. S. Hill, Grays Harbor Ry. & Lt. Co.
W. C. McLagan, Mount. States Pwr. Co.
Thos. Perry, Northwestern Elect. Co.
E. W. Seckendorf, Puget Sound Pwr. & Lt. Co.
J. E. Yates, Pacific Pwr. & Lt. Co.

UNDERGROUND SYSTEMS COMMITTEE

E. F. Pearson, Northwestern Elect. Co., chairman.
P. P. Ashworth, Utah Pwr. & Lt. Co.
S. B. [illegible]rk, Northwestern Elect. Co.
J. M. [illegible]ham, Portland Elect. Pwr. Co.
C. H. [illegible]e, Puget Sound Pwr. & Lt. Co.
T. A. [illegible]rton, Idaho Pwr. Co.
F. L. Rohrbach, Wash. Water Pwr. Co.

PUBLIC RELATIONS SECTION

EXECUTIVE COMMITTEE

G. L. Myers, Pacific Pwr. & Lt. Co., chairman.
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N. W. Brockett, Puget Sound Pwr. & Lt. Co.
R. B. King, Idaho Pwr. Co.
L. A. Lewis, Wash. Water Pwr. Co.
W. H. Lines, Portland Elect. Pwr. Co.
W. B. McDonald, Mount. States Pwr. Co.
Z. E. Merrill, Mount. States Pwr. Co.
P. M. Parry, Utah Pwr. & Lt. Co.
G. C. Sawyer, Pacific Pwr. & Lt. Co.
S. E. Skelley, Pacific Pwr. & Lt. Co.
W. H. Ude, Wash. Water Pwr. Co.
Mary K. Walsh, Wash. Water Pwr. Co.
Dwight Ware, Puget Sound Pwr. & Lt. Sec. Co., chairman.
H. G. Winsor, Puget Sound Pwr. & Lt. Co.

CO-OPERATION WITH EDUCATIONAL INSTITUTIONS COMMITTEE

R. M. Boykin, Puget Sound Pwr. & Lt. Co., chairman.
E. L. Bourne, Utah Pwr. & Lt. Co.
H. L. Bromley, Calif. Ore. Pwr. Co.
J. P. Lottridge, East. Ore. Lt. & Pwr. Co.
S. E. Skelley, Pacific Pwr. & Lt. Co.
W. P. Strandborg, Portland Elect. Pwr. Co.
W. H. Ude, Wash. Water Pwr. Co.

CUSTOMER OWNERSHIP COMMITTEE

Dwight Ware, Puget Sound Pwr. & Lt. Sec. Co., chairman.
(Personnel not yet announced.)

EMPLOYEES' RELATIONS WITH THE INDUSTRY COMMITTEE

H. G. Winsor, Puget Sound Pwr. & Lt. Co., chairman.
(Personnel not yet announced.)

EMPLOYEES' RELATIONS WITH THE PUBLIC COMMITTEE

G. C. Sawyer, Pacific Pwr. & Lt. Co., chairman.
Geo. Sullivan, Portland Elect. Pwr. Co.
John Wisdom, Northwestern Elect. Co.

PUBLIC INFORMATION COMMITTEE

S. E. Skelley, Pacific Pwr. & Lt. Co., chairman.
J. H. N. Adams, Mount. States Pwr. Co.
E. L. Bourne, Utah Pwr. & Lt. Co.
H. L. Bromley, Calif. Ore. Pwr. Co.
G. B. Foster, Wash. Water Pwr. Co.
A. G. Gordon, Puget Sound Pwr. & Lt. Co.
E. C. Kiersted, Idaho Pwr. Co.
W. P. Strandborg, Portland Elect. Pwr. Co.

RELATIONS WITH FINANCIAL INSTITUTIONS COMMITTEE

W. H. Lines, Portland Elect. Pwr. Co., chairman.
D. C. Green, Utah Pwr. & Lt. Co.
W. H. McGrath, Puget Sound Pwr. & Lt. Co.
W. R. Putnam, Idaho Pwr. Co.
V. G. Shinkle, Wash. Water Pwr. Co.

WOMEN'S COMMITTEE

M. K. Walsh, Wash. Water Pwr. Co., chairman.
Mrs. A. W. Angell, Northwestern Elect. Co.
Marguerite Butler, Portland Elect. Pwr. Co.
Stella Dorgan, Mount. States Pwr. Co.
M. O. Goldapp, G.E. Co.
M. C. Johnson, Deschutes Pwr. & Lt. Co.
Thelma Kelly, Pacific Pwr. & Lt. Co.
Mrs. Nell Laws, Puget Sound Pwr. & Lt. Co.
Mrs. Gertrude McDevitt, Idaho Pwr. Co.
Esther Miller, Grays Harbor Ry. & Lt. Co.
Mrs. Helen Minkler, Calif. Ore. Pwr. Co.
Mrs. A. E. Moyle, Utah Pwr. & Lt. Co.

GENERAL COMMITTEES

CIVIC DEVELOPMENT COMMITTEE

O. B. Coldwell, Portland Elect. Pwr. Co., chairman.
(Personnel not yet announced.)

CONTACT WITH WOMEN'S CLUBS ON BETTER EQUIPPED HOMES CAMPAIGN COMMITTEE

Idaho: E. C. Kiersted, Idaho Pwr. Co.
Montana: A. B. Sibley, Helena Gas & Elect. Co.
Utah: R. M. Bleak, Utah Pwr. & Lt. Co.
Washington: N. W. Brockett, Puget Sound Pwr. & Lt. Co.
Oregon: C. M. Sanford, Pacific Pwr. & Lt. Co.

EDUCATIONAL COMMITTEE

B. H. Snow, "Electrical West," chairman.
(Personnel not yet announced.)

INFORMATION BUREAU ORGANIZATIONS COMMITTEE

F. T. Griffith, Portland Elec. Pwr. Co., chairman.
(No committee to be appointed.)

INSURANCE COMMITTEE

L. A. McArthur, Pacific Pwr. & Lt. Co., chairman.
(No committee to be appointed.)

MEMBERSHIP COMMITTEE

B. H. Snow, "Electrical West," chairman.
N. W. Brockett, Puget Sound Pwr. & Lt. Co.
W. E. Huddleson, Portland Elec. Pwr. Co.
(Others to be appointed.)

RESEARCH COMMITTEE

D. F. McCurrach, Northwestern Elect. Co., chairman.
A. E. Janssen, Idaho Pwr. Co.
A. J. Johnstone, Portland Elect. Pwr. Co.
R. H. Jones, Utah Pwr. & Lt. Co.

Contractors, Dealers and Inspectors

Seattle Plans For Northwest Inspectors' Convention

Plans for a successful program at the third annual convention of the Northwest Association of Electrical Inspectors, in Seattle, Jan. 26-28, 1928, are rapidly taking shape. Several promises from those invited to participate in this program have been received by H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, 1100 Alaska Building, Seattle, who is general convention chairman. Among those who will address the convention, as far as it is definitely known at this time, are: Dana Pierce, president, Underwirters' Laboratories, Inc., Chicago; H. B. Kirkland, secretary, Society for Electrical Development, New York; W. A. Groce, state fire marshal, Olympia, Wash.; L. W. Going, chief electrical inspector, and J. C. Caine, deputy electrical inspector, Portland; and G. K. Comstock, of the American Products Corporation, William Meacham, of Meacham & Babcock, contractors and engineers, and R. A. Laing, fire marshal, Seattle, all of whom have messages of importance and interest to the electrical inspection fraternity of the Northwest.

Other speakers of national or local prominence in their fields have been invited to participate and are yet to be heard from, so that a full and interesting program seems assured.

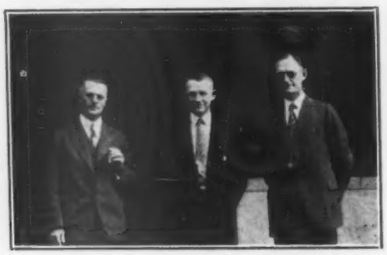
The custom begun last year of having a manufacturers' exhibit of equipment as a feature of the convention will be continued this year, and T. S. Wood, Packard Electric Company, Seattle, who is in charge of this activity of the convention, reports that practically all available space for such exhibits has been contracted for. The exhibition this year will be in one end of the convention hall, the spacious Spanish ballroom of the Olympic Hotel, which will be convention headquarters.

Entertainment features will include, among other events, a dinner dance, banquet and inspection trips. Harry T. Martin, National Corbon Company, Seattle, is chairman of the entertainment committee. The convention is being sponsored by the Electric Club of Seattle.

George R. Dehn, formerly estimator with the **English Electric Company**, has recently been added to the staff of the **National Home Equipment Company**, Seventh and Bonnie Brea Streets, Los Angeles, as estimator and construction superintendent. The National Home Equipment Corporation was started some months ago by **Gilbert Woodill** and is concentrating on the sale of home electrical equipment.

Reorganize San Diego Association.—A recent reorganization of the San Diego Electrical Contractors' Association has been made and plans are now under way for a constructive program. The new officers elected were: **Gill Cunningham**, president; **Bruno Barth**, vice-president; **V. R. Knight**, secretary-treasurer, and **O. W. Karl**, sergeant-at-arms. The association started with weekly meetings but it is planned to hold only monthly meetings after the preliminaries of organization are completed.

Three Oregon Wise Men



R. C. Kenney, executive committeeman, district 1, C. A. Vibbert, president, and J. R. Tomlinson, secretary and treasurer of the Oregon Electragists.

All-Metal Ordinance Adopted in Glendale

The new all-metal ordinance recently adopted by the Glendale city council is one which requires that a plan be filed before any job is started. Further provision is made for the examination of both master electricians and journeymen, at no increase in fee. The all-metal clause permits the use of either rigid or flexible steel conduit.

The examining committee consists of one master electrician, one journeyman electrician and the chief inspector, with the superintendent of the building as an ex-officio member. **P. R. Matchtolf**, electrical contractor of Glendale, was selected as the master electrician member of the examination board for the first year.

It is said that good journeymen are at a premium as a result of the examination instituted under the ordinance and that a small percentage of Glendale contractors succeeded in passing the master electricians examination. In spite of this, however, all are making efforts to requalify for re-examination since it is felt that the purpose of the examination is to disqualify cheap or incompetent workmanship. As a result, no competent applicant seeking to perform electrical work in Glendale will be unduly penalized, according to the examining board.

California Inspectors Name New Committees

Announcement has been made by Harry Beecher, president of the California Association of Electrical Inspectors, of his appointment to committees for this year. In a letter recently issued by C. W. Mitchell, secretary of the association, the following list of committees and personnel was announced and members of the committees asked to get in touch with each other without delay in order that the work of the association might proceed:

COMMITTEES

1. **Articles of Assocation Committee**
   1927-1928
   R. H. Manahan, Los Angeles, chairman.
   J. M. Evans, Los Angeles.
2. **Clearing House Committee**
   Ben C. Hill, Oakland.
3. **Demand Factor Committee**
   J. M. Evans, Los Angeles, chairman.
   R. J. Larrabee, San Francisco.
   E. J. Crawford, Fresno.
   J. W. Wrenn, San Francisco.
4. **Ordinance Committee**
   J. M. Evans, Los Angeles, chairman.
   O. Barnwell, Beverly Hills.
   James McConahey, Los Angeles.
5. **State Safety Orders Committee**
   C. E. Hardy, Oakland, chairman.
   R. H. Manahan, Los Angeles.
   R. W. Wiley, San Francisco.
   H. G. Ufer, Los Angeles.
6. **National Elec. Code Articles 1, 2, and 3 Committee**
   K. J. Bickel, Martinez, chairman.
   W. E. Brothers, Berkeley.
   C. Drathman, Redwood City.
   M. L. Hutchinson, Monrovia.
7. **National Elec. Code Articles 4, 8, 12 and 13 Committee**
   J. C. Hamilton, San Jose, chairman.
   S. F. Butler, Salinas.
   F. W. C. Butow, San Bruno.
   J. I. Dixon, Santa Clara.
   Walter Scott, Burlingame.
   Wm. Byrne, South San Francisco.
   H. C. Noble, Los Gatos.
8. **National Elec. Code Articles 5, 6 and 7 Committee**
   R. H. Manahan, Los Angeles, chairman.
   J. H. Crannell, Glendale.
   Edw. F. Henzel, San Francisco.
   Fred Vore, Pasadena.
9. **National Elec. Code Articles 9 and 19 Committee.**
   R. H. Manahan, Los Angeles, chairman.
   R. Edwards, Santa Barbara.
   J. M. Evans, Los Angeles.
   C. E. Jenkins, Alhambra.
   W. O. Packard, Santa Ana.
10. **National Elec. Code Articles 10, 30, 31 and 50 Committee**
    C. E. Hardy, Oakland, chairman.
    G. E. Kimball, San Francisco.
11. **National Elec. Code Articles 11, 16, 17 and 32 Committee**
    C. R. Meikel, Bakersfield, chairman.
    L. S. Gibbs, Sonora.
    E. H. Lane, Delhi.
12. **National Elec. Code Articles 14, 15 and 38 Committee**
    C. W. Beaton, Sacramento, chairman.
    F. C. Colville, San Leandro.
    E. C. Gerry, Monterey.
    C. L. Heney, Eureka.
    F. A. Morrell, Stockton.
    H. C. Weisenburger, Watsonville.
13. **National Elec. Code Articles 18, 33 and 40 Committee**
    A. E. Johnstone, San Diego, chairman.
    C. D. Felger, Colton.
    R. H. McKibbin, El Centro.
    J. W. Munn, Glendale.
    D. H. Alexander, Long Beach.
    A. M. Proctor, Chula Vista.
14. **National Elec. Code Articles 34, 35, 36 and 39 Committee**
    J. M. Evans, Los Angeles, chairman.
    D. E. Graham, Burbank.
    H. A. Johnson, Ventura.
    J. McConahey, Los Angeles.
    W. N. Parsons, Orange.
15. **National Elec. Code Articles 37 and 60 Committee**
    R. W. Wiley, San Francisco, chairman.
    A. V. Youens, Palo Alto.
    O. W. Tait, Mountain View.

The Coast Electric & Machinery Company, located at 45 Market Street, Venice, Calif., has opened a branch store at 1122 Washington Boulevard, also in Venice.

Another "Barnstorming" Tour Planned in January

The next series of group meetings bringing to electrical contractors another estimator's class under the auspices of the California Electragists is scheduled to start Monday, Jan. 16, with the first meeting at San Luis Obispo. A similar class will be taken through the southern part of the state simultaneously.

C. J. Geisbush, state manager, assisted by **George Eldridge,** field representative, Northern Division, will conduct the classes in the northern part of the state while **H. W. Barnes,** assistant secretary, Southern Division, will conduct the classes in that region.

The subject to be discussed, it is planned, will be in the nature of a study of the items comprising overhead in order to give assistance to contractors in planning for the new year's work as well as to summarize that of the past year.

Other meetings announced by the Electragists are:

Northern Division meetings, March 9-10, Sacramento (probably for contractors only).

Southern Division meeting, April, some time between 15 and 25, date and place to be announced later.

State Motor Section, Fresno, April 13-14. Two-day sessions of motor specialists for a closer examination of their individual problems.

Electrical Workers Endorse Red Seal Plan

The Electrical Workers of Sacramento held a Red Seal meeting on Nov. 14. About 80 were present. They were addressed by J. A. McWilliams of the California Electrical Bureau.

They authorized their business agent to send a Red Seal Plan circular to all parties building new homes, and appointed a committee to see that all electrical workers on jobs be held responsible for endeavoring to make them full Red Seal.

Universal Electric Company is a new electric store opened at 5901 South Broadway, Los Angeles, by **Phil Newman.** A complete line of fixtures and appliances is stocked and general electrical contracting and repairing is being handled from the store.

Good and Sufficient Reason

Five good reasons for winning a $200 cash prize and gold medals for the first place in the Sunshine Gold League bowling tournament in San Diego may be seen in the accompanying photograph. These five men constitute the California Electric Works' bowling team. All but one are employees of that company, the first man from left to right, M. R. Madero, being an employee of another electrical contractor, the Zweiner Electric Company. The others are F. H. Schaff, F. W. Sloan, F. M. Smith and L. H. Hinkley.

To Sell Fixtures Only.—Two Denver electrical contractors in recent months have announced a change from the status of electrical contracting to that of the sales of electrical fixtures only. The **Kaffer-Chapman Electric Company** announced recently that it was going to dispose of its entire stock of wiring supplies and appliances and confine its efforts to the sale of electrical fixtures alone with the object in mind eventually of transferring from retail to wholesale fixture business. **Harry Shockett** likewise recently announced a similar change. Mr. Shockett said that he was gradually winding up the affairs of his contractor-dealer business and that by July 1 expected to be ready to start the wholesaling of lighting fixtures. He was moving into a new location at 1331 Tremont Street, which was being prepared for a fixture display room.

George R. Randall and **Joseph L. Lawrence** of the **Salt Lake Electric Supply Company** recently added to their interests the operation of a motion picture theater, The Rialto, in Salt Lake City.

Good Medicine Too

CROSLEY RADIO
BETTER • COST LESS
Proven Performance and Dependability
All Latest Models Now on Display
Complete Radio and Electrical Service
Seven Years in Hollywood
Member International Association of Electragists
DORAN ELECTRIC SHOP
TWO STORES — CONVENIENTLY LOCATED
7515 Sunset Blvd.
6030 Santa Monica Blvd.

Pat Doran, in his local advertising proudly declares his affiliation with the A.E.I. The newspapers, however, insist on spelling "Electragists" as if it were some new kind of electric treatment.

Salt Lake Contractors Organize.—An organization known as the "Electrical Contractors and Contractor-Dealers Association" has been formed recently in Salt Lake City with the object of promoting the best interests of these branches of the electrical industry in that territory. The officers are: R. R. Reid, president; A. N. Sisam, vice-president; J. C. Jacobs, treasurer, and R. E. Folland, secretary.

H. R. Hartman, formerly in the employ of the **Linwood Electric Company** of Linwood, Calif., recently started a contracting establishment under his own name in the same district.

John P. Mathews Company, electrical contractors and engineers, have moved from 11339 Santa Monica Boulevard to 11525 Santa Monica Boulevard, Sawtelle, Calif.

Will Rogers' Neighbors

Paul Needham, Electragist, and his wife help to make Beverly Hills safe for more electricity.

New Ordinance in San Diego Proposed.—A new ordinance embodying several unusual features is being considered by the city council of San Diego. It has been submitted to the council by the code committee consisting of A. E. Johnstone, city electrician; W. W. Gibson and Jeff Zweiner, representing the contractors; Leon Shook, labor representative for the seventh district; Frank Munroe, representing the jobbers; and William H. Talbott, representing the San Diego Consolidated Gas & Electric Company. Both the Pacific and National Underwriters' codes are embodied in the new ordinance as well as the safety orders of the state, including the demand factor and voltage drop tables. Tables also from the safety orders and from the Railroad Commission's orders on street crossings are embodied. The ordinance contemplates bonding and licensing and examinations for contractors and journeymen.

Aberdeen and Hoquiam Ordinances.—New ordinances recently have been adopted in both Aberdeen and Hoquiam, Wash., which will bring national electrical code requirements into those districts. The ordinances were passed with the assistance of **T. H. Edwards,** inspector and city electrician, Aberdeen, and **W. E. Crawford,** city electrician, Hoquiam, and of the service department of the Grays Harbor Railway and Light Company serving that district.

Durham & Evans, electrical contractors and dealers, who opened a new store in Montebello a short time ago at 305 Whittier Boulevard, have gone into the merchandising business to such an extent as to find their quarters too crowded and have taken a new and larger store at 917 Whittier Boulevard, in the new I.O.O.F. Building.

Frank Sherman, formerly proprietor of the **Sherman Electric Company** at Corning, Calif., recently took over the contracting business of **Vieaux Bros.** at 1030 B Street, Hayward, Calif.

The Southern Electric Store is an addition to Bellflower, Calif., recently opened by **Roy Southern.** Mr. Southern is installing a complete line of fixtures and appliances.

Personals

Richard E. Smith, advertising manager for the Southern California Edison Company, Los Angeles, has been appointed general convention chairman of the 1928 convention of the Pacific Coast Electrical Association. That makes the P.C.E.A. convention something to look forward to, for those who know Mr. Smith—and they are many—know that he not only has many excellent ideas but is capable of having those ideas put into execution.

RICHARD E. SMITH

Mr. Smith has been a member of the electrical industry in California for more than twenty-one years, the last six of which he has spent as advertising manager for the Southern California Edison Company. He began his career as a wireman's helper in San Diego. Later he served as Pacific Coast representative of the National X-Ray Reflector Company, as sales manager of the Mt. Whitney Power Company, and as district manager of the Edison company's Tulare office.

Mr. Smith has given unstintingly of his time and ability in the service of the Pacific Coast Electrical Association. He has been particularly active in the Advertising-Publicity Section and the Public Relations Section, having served during the 1925-6 administration on the general committee of the Advertising Section and on the executive committee of the Public Relations Section. Last year he was a member of the Public Relations Section and chairman of the Advertising-Publicity Section. Mr. Smith also has taken a prominent part in the affairs of the Los Angeles Electric Club, of which he is a past president.

With "Dick" Smith as general chairman, a very successful convention is predicted for 1928.

Ely C. Hutchinson, president, Pelton Water Wheel Company, San Francisco, returned lately from his annual trip to the New York headquarters and other Eastern offices of the company.

R. B. Evans, transmission engineer, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., discussed "General Problems Relating to High-Voltage Systems" at the recent annual dinner of the Seattle Section A.I.E.E. **C. R. Wallis** of the General Electric Company, chairman of the Seattle section, presided at the dinner.

F. V. Gillum and **M. Tucker,** both formerly connected with the test department of the Southern California Edison Company at Alhambra, have been transferred permanently to Pomona to do substation equipment testing for the eastern division of the company.

C. E. Groesbeck, executive vice-president, Electric Bond & Share Company, New York, and formerly vice-president and general manager, Utah Power & Light Company, spent some time in Salt Lake City recently during a trip of inspection of Electric Bond & Share properties.

Loren Emery, until recently merchandise sales manager of the International General Electric Company, has been appointed a member of the executive department of that company and assigned to special duties in Mexico.

John J. Carty, vice-president of the American Telegraph & Telephone Company, New York, and a past president of the American Institute of Electrical Engineers, has been awarded the John Fritz gold medal for 1928 for his achievements in telephone engineering. This award is made annually by a board of sixteen representatives of the American Societies of Civil, Mining and Metallurgical, Mechanical and Electrical Engineers.

W. H. Hodge, since 1910 manager of the advertising and publicity department of the Byllesby Engineering & Management Corporation, has been elected a vice-president and manager of a newly created sales and advertising department with headquarters in Chicago.

Norman MacBeth, president, MacBeth Daylighting Company, Inc., has been elected president of the Illuminating Engineering Society.

E. D. Murray, formerly with the Coast Counties Gas & Electric Company, Santa Cruz, Calif., has joined the staff of the California Railroad Commission.

A. J. Browning, for the past five years manager of the Robertson-Cataract Electric Company's branch at Syracuse, N. Y., has accepted a position as sales manager of the Inter-Mountain Electric Company of Salt Lake City, Utah. Mr. Robertson succeeds **H. W. Read,** who has resigned to enter the hotel business.

Frank W. Peek, Jr., has been placed in general charge of the transformer engineering department of the General Electric Company's plant at Pittsfield, Mass. Mr. Peek, who is a native of Mokelumne Hill, Calaveras County, Calif., one of the famous early-day mining camps, is well known for his studies in high-voltage engineering.

E. W. Rockwell, assistant engineer, department of engineering design, Southern California Edison Company, Los Angeles, attained the distinction of making a hole in one on the Pebble Beach golf course during the recent A.I.E.E. convention at Del Monte, Calif.

C. C. Hockley, consulting engineer, formerly in the Northwestern Bank Building, Portland, has removed to larger quarters at 801-02 Spalding Building in that city.

Joseph Bowes, manager, and **Lansing S. Thorne,** general superintendent of railways, respectively, El Paso Electric Company, El Paso, Texas, were in attendance at the annual convention of the American Electric Railway Association held recently in Cleveland. Following the convention they made a trip to the headquarters of Stone & Webster, Inc., in Boston.

C. F. Oehmler, former city electrician of Denver, and recently associated with **Fred E. Staible, Inc.,** announced recently that he had left the latter company Sept. 15. He announced no future plans.

Howard S. Robertson, president, the Denver Tramway Company, recently was elected president of the Colorado Utilities Association, formerly the Colorado Public Service Association. Mr. Robertson has been connected with that company since 1901 when he entered its employ in the claims department. Two years later he entered the legal department and in 1906 was promoted to the position of general attorney. He served as secretary and general manager of the company until July, 1925, when he was made vice-president and general manager, a position he held until he was appointed president to succeed the late Ernest Stenger. He received his early education in the public schools of Denver and was graduated from the University of Colorado with the degree of LL.B.

Mr. Robertson always has taken an active part in the affairs of the Colo-

HOWARD S. ROBERTSON

rado Utilities Association and last year served as vice-president. The administrative year of the association having been changed to include the period from July 1 to June 30, the officials elected at the recent convention will assume their duties July 1, 1928, and will serve until June 30, 1929.

Jack Barner has been transferred from Wilbur, Wash., to Kendrick as district agent for The Washington Water Power Company. **Stanley Breed** of Davenport has succeeded Mr. Barner as district agent at Wilbur, and **Boyd Fink** has left Harrington to act as district agent at Davenport.

Thomas W. Hughes, superintendent of the Sheridan County Electric Company, Sheridan, Wyo., has been transferred to the position of manager of the Rawlins Electric Light & Fuel Company, Rawlins, Wyo.

John F. MacLane, general attorney for the Utah Power & Light Company, Salt Lake City, was elected president of the public utilities section of the American Bar Association at its recent convention in Buffalo, N. Y.

Frank Bevan, formerly salesman in the Colgate Division of the Pacific Gas and Electric Company, with headquarters in Marysville, Calif., has joined the general sales department of that company in San Francisco.

Dean D. Clark, treasurer of the Electrical League of Colorado, recently received a twenty-year button from the Mountain States Telephone and Telegraph Company, Denver, in commemoration of his services with that company for that period of time.

J. L. Kennedy, formerly salesman in the Drum Division of the Pacific Gas and Electric Company at Auburn, Calif., has been transferred to the sales department of the San Jose Division at San Jose, Calif.

Obituary

Harry L. Brown, secretary, Ohio Brass Company, Mansfield, Ohio, died suddenly Oct. 23 following an operation for acute appendicitis. Mr. Brown joined the Ohio Brass Company early in 1925. Prior to that he had been associated with the McGraw-Hill Publishing Company for a period of ten years, first as assistant editor of Electrical World in Chicago and then subsequently as, successively, assistant editor, western editor, managing editor and editor of Electric Railway Journal.

Judge Elliot M. Wilson, president, Pacific Coast Steel Company, San Francisco, died in that city Nov. 22 at the age of 82 after an illness of six months. Judge Wilson was a pioneer in the steel industry on the Pacific Coast, having been identified with it for about thirty-five years. He became president of the Pacific Coast Steel Company in 1911 when that company was formed as the result of merging the plant of the Seattle Steel Company, in which he was interested, with plants in Portland and San Francisco.

Joseph McMillan, former general manager of the Pacific Electric Railway, Los Angeles, died in that city Oct. 18. In 1918 Mr. McMillan retired from active service with the Southern Pacific and affiliated companies after forty-four years of railway work.

John Otto, veteran purchasing agent for the Southern California Edison Company, died suddenly Oct. 16 while on a visit to his old home in Mount Clemens, Mich. Mr. Otto became associated with the Edison company as district manager in Long Beach, later occupying similar positions at Santa Barbara and Pasadena. In 1907 he was made purchasing agent, the position which he held at the time of his death.

G. B. Hauff, until recently a member of the firm of Burghardt & Hauff, electrical dealers, Seattle, died in San Diego, Calif., Oct. 17.

Kurt C. Barth, director of the research division of the Western Red Cedar Association, died in Evanston, Ill., Oct. 9.

L. L. Bryant, electrical contractor of Greeley, Colo., died in that city Oct. 24.

Books & Bulletins

THE ESSENTIALS OF TRANSFORMER PRACTICE

By Emerson G. Reed, B.S. in E.E., member A.I.E.E., associate editor Pender's Handbook for Electrical Engineers. Second edition, revised and enlarged; 5½ x 8½ in.; cloth bound; 491 pages; 185 illustrations; 17 tables. Published 1927 by D. Van Nostrand Company, Inc., 8 Warren Street, New York City. Price $5.

This book covers completely and concisely practically all of the important considerations incident to the design, construction and operation of transformers for various services. The book is divided into 36 separate chapters, each dealing with a particular phase of the subject and running all the way from a discussion of the evolution of the transformer to a discussion of the economical ratio between copper and iron losses and including various problems and methods of design, and various problems incident to transformer operation. Both potential and current transformers also are considered and several chapters are devoted to them. Likewise, several chapters are devoted to such operating problems as phase transformation as accomplished with various types of transformers and auto-transformers.

The economics of transformer operation are considered in three chapters which deal respectively with the loading of transformers on a temperature basis, the yearly cost of transformer operation, and conditions for minimum cost of transformer operation.

Only such theories are developed as have a direct bearing upon transformer design and operation. Thus the text is in no wise encumbered with complicated mathematical developments. In preparing this work the author has had in mind a book that would be of service to engineering students as well as to designing and operating engineers who may be interested in the subject of transformers. Care has been taken to maintain a practical engineering point of view in the preparation of the text which is well handled for the purpose for which it was designed. The book combines theory and practice to an evident advantage.

OVERHEAD SYSTEMS REFERENCE BOOK

Prepared by a special committee of the Overhead Systems Committee, Engineering National Section, N.E.L.A. 572 pages; 668 illustrations; 127 tables; 8½ x 11 in.; bound in flexible, maroon-colored fabrikoid. Published by the National Electric Light Association, New York City, 1927. Price $7.50; to members of the association, $5.

A veritable mine of authentic information for those interested in overhead transmission and distribution systems, it represents the combined experiences and efforts of electrical engineers connected with electric light and power companies throughout the United States. While this book succeeds the old "Handbook on Overhead Line Construction," for some years out of print, the new book is appreciably more than a handbook and comprises a reference volume that is a valuable addition to electrical publications.

It was the specific aim of the editors and publishers of this book to issue it as engineering information and not as a book of rules and regulations and no attempt has been made in it to create standards or definite specifications or to govern rigidly construction methods.

The book is divided into twelve major sections, each considering one particular phase of the general subject, as follows: wood poles, preservative treatment, and concrete poles; steel poles, towers and substation structures; properties of materials; insulators; transformers and regulators; protective apparatus; street lighting; electrical calculations; mechanical calculations of transmission and distribution lines; methods of construction for low and medium-voltage lines; meteorological data; tree trimming, and general safety suggestions; and an appendix wherein are suggested specifications for overhead construction material.

MODERN IGNITION SIMPLY EXPLAINED

By H. H. U. Cross, electrical engineer formerly with the Union of South Africa Government. 144 pages; 58 illustrations; 5 x 7 in.; cloth bound. Published 1927 by Crosby Lockwood & Son, 7 Stationers Hall Court, Ludgate Hill, London. Price 4/-.

This book is designed to be easily understandable to the non-technical person interested in modern ignition systems and their construction, maintenance and ordinary repairs. The text is divided into twelve chapters dealing successively with general ignition principles and the principles of induction, magnetism, various kinds of magnetos, the coil-dynamo-battery system of ignition, timing and maintenance.

Meetings

Coming Events

California Electragists—Meeting of Northern Division at Sacramento, March 9-10, 1928.

Meeting of State Motor Section at Fresno, April 13-14, 1928.

Pacific Coast Electrical Association.—Annual convention, Huntington Hotel, Pasadena, June 12-15, 1928.

Group meetings of Engineering Section at Clift Hotel, San Francisco, Jan. 11-13, 1928.

Northwest Association of Electrical Inspectors—Annual convention and electrical exhibition at Olympic Hotel, Seattle, Wash., Jan. 26-28, 1928.

Northwest Electric Light and Power Association.—Engineering Section—General meeting in Spokane, March 8-9, 1928.

Annual convention in Portland, June 19-22, 1928.

Utilities Commissioners Discuss Regulation and Evaluation

Regulation and the establishment of a definite basis of valuation were among the major subjects of importance discussed at the thirty-ninth annual convention of the National Association of Railroad and Utilities Commissioners held at Dallas, Texas, Oct. 18-21. Representatives of thirty-eight states were in attendance.

Among the more important addresses made were that of John F. Shaughnessy of Nevada, president of the organization, and that of William A. Prendergast, chairman of the Public Service Commission of New York. Mr. Shaughnessy, while deprecating the fact that state regulatory initiative in the railroad fields had been destroyed, showed why the state should keep control over the other utilities for all practical purposes. Mr. Prendergast said that the National Association of Railroad and Utilities Commissioners should assume leadership in establishing some definite basis of valuation; otherwise the question might become a political issue. He urged that present problems be considered in the light of present conditions. Adolph Canneberg, of the Wisconsin Railroad Commission, pointed out the loopholes and weaknesses of regulatory laws as well as handicaps to commissions of the different states.

The state commissions endorsed as a unit the sentiments expressed by the committee on public ownership and operation to the effect that public ownership and operation of public utility plants is not in the general public interest and not at all desirable. Joseph B. Eastman, delegate from the Interstate Commerce Commission, filed a minority report in whch he disagreed radically with the findings of the majority and warned against prejudice.

Officers elected for the ensuing year were: president—Henry G. Wells of Massachusetts; first vice-president—Lewis E. Gettle of Wisconsin; second vice-president—Charles Webster of Iowa; secretary—James B. Walker of New York; assistant secretary—Clyde S. Bailey of Washington, D. C.; general solicitor—John E. Benton of Washington, D. C.

I.E.S. Holds Interesting Meeting.—A special evening meeting was held recently in San Francisco by the Bay Cities Chapter of the Illuminating Engineering Society in honor of Preston S. Millar, general manager of the New York Testing Laboratories. Mr. Millar gave an interesting informal talk on "Progress in Street Lighting and Residence Lighting." After the meeting Mr. Millar was taken on a tour of inspection of recent street-lighting installations around the bay. James Mundstock, Pacific Coast manager, I. P. Frink, Inc., as chairman of the program committee was in charge of arrangements for the meeting, which was attended by about thirty members of the organization.

There's a Reason

Miss L. Ethel Boston is executive secretary of the Los Angeles Electric Club. Perhaps those who have heard of the remarkably high attendance at the club's meetings and marveled thereat may find food for thought in this statement. Other electric clubs please note.

Utah Utility Entertains Rotary Club.—Members of the Rotary Club of Ogden, Utah, were guests of the Utah Power & Light Company, at its new Cutler plant on the Bear River, a short time ago. They were conducted on an inspection tour through the plant and given details concerning the construction and operation of this newest of the company's hydroelectric developments. Following the inspection tour luncheon was served at the plant.

Oakland Electric Club Meeting Features Red Seal Plan

A recent meeting of the Oakland Electric Club was given over to a Red Seal program with Gardner Buss, chairman of Red Seal District No. 9, acting as chairman of the day. J. A. McWilliams, field representative of the California Electrical Bureau, presented a review of Red Seal Specifications and a report of accomplishments to date. He was followed by A. Cook, electrical contractor of Berkeley, who pointed out the how and why of practical application of the Red Seal program to the electrical contractors' business and particularly urged all branches of the industry to talk Red Seal to their clients.

Mr. Wastell, of Williams & Wastell, residential architects of the East Bay territory, presented a somewhat new and very interesting sidelight on the value of the Red Seal program to his profession when he pointed out that the wiring of a building was one of the smallest contracts, if not the smallest, awarded in dollars and cents. He stated that as it was fast becoming one of the most important from the convenience standpoint, it was giving the architect no little concern as to how to handle the situation and that therefore the Red Seal specifications should be very welcome as they would be of material assistance in planning layouts.

The Oakland Electric Club, which recently inaugurated its fall term, following a vacation period, holds its luncheon meeting every Wednesday at the Elks Club, Twentieth and Broadway.

Service Pins Presented at Power Club Election

A recent election held by the members of the Fresno San Joaquin Power Club, the employees' organization of the San Joaquin Light & Power Corporation, resulted in choice of Lee R. Duncan as president for the ensuing year. He succeeds A. S. Walthall, retiring president.

At the meeting, which was attended by more than 250, fifteen-year service pins were presented by A. G. Wishon, president of the company, to the following: G. W. Dumble, John P. Ogle and Fay G. Strain of Fresno; Andrew J. Crum and Samuel Potts of Bakersfield; Bueferd Babbs of Merced; Oscar A. Kommers of Taft; and Frank R. McGeorge of Balch power house. J. J. Mackey and Garrett L. Van Buren of Fresno and Ernest W. Rosenberg of Bakersfield, also fifteen-year employees, were unable to be present. Twenty-year pins were awarded to E. P. Smith, E. R. Banks, William H. McKenzie and William L. Jacobs of Fresno; Scott Hughes of Merced and William McElligot of Bakersfield. Twenty-five-year pins went to J. E. Strahan of Fresno, Raleigh Casad of Merced, and D. L. Wishon of Bakersfield. J. B. Carter of Fresno and E. F. Millard of Bakersfield, also twenty-five-year employees, were unable to be present.

Manufacturer & Distributor

Under the name of **United States Electric Corporation,** a merger has been announced of the **Apex Electric Manufacturing Company** and the **Sentinel Manufacturing Company,** both of Chicago, the **Indiana Electric Manufacturing Company** of Marion, Ind., **Slagle Radio Company** of Fort Wayne, Ind., and the **Workrite Manufacturing Company** of Cleveland. The merger of these companies, which are manufacturers of a diversified line of radio, electrical and automotive products, was brought about for the purpose of helping stabilize the patent situation in the radio industry as a whole, according to the announcement. Headquarters will be maintained at Chicago.

The Standard Electric Stove Company, Toledo, Ohio, recently held its annual sales meeting at which **Charles A. Pierson,** general manager, presided. Addresses were made by officials of the company and by electrical and merchandising specialists. **S. L. Kelly,** president of the company, welcomed the salesmen, who during the convention were entertained by a theater party, a bowling turnament and a dance.

Electric Supplies Distributing Company, 924 Second Street, San Diego, Calif., has been appointed distributor for the **Westinghouse Electric & Manufacturing Company.** Officers of the Electric Supplies Company are: president—**W. C. Wurfel,** vice-president and manager—**S. L. Hall,** secretary and treasurer—**Grant Guthrie. Fred G. Goss** is sales manager.

The Robbins & Myers Company of Springfield, Ohio, has taken over the patents of the **Meyer Electric Manufacturing Company,** Houston, Texas, manufacturer of clock-operated time switches, and will add this item to its line of motors and fans.

Central Tube Company, Pittsburgh, has announced the appointment of **A. S. Lindeblad** as district sales manager in charge of the pipe department of its Chicago office. **David M. Cooper, Jr.,** will be Mr. Lindeblad's assistant. **E. F. Meyers,** who has been with the company for several years, will continue to represent it in Chicago.

The General Electric Company has appointed as its regional specialist of the Merchandise Division in charge of its Rocky Mountain district with headquarters in Denver, **William O. Smith,** formerly conected with the **Butte Electric Supply Company.**

The Miller Company, Meriden, Conn., has purchased control of the **Monowatt Corporation** of New York City. The Monowatt Corporation in turn has purchased Plant No. 2 of the **Connecticut Telephone & Electric Company** and organized **The Connecticut Molded Products Corporation** of Meriden. The Monowatt company also owns the stock of the **New England Metal Products Corporation** of the same city.

The Square D Company, Detroit, has appointed as its district representative to handle the Denver and Salt Lake territory, **H. A. Tewksbury,** formerly employed in the electrical department of **Hendrie & Bolthoff** and more recently connected with the **Graybar Electric Company.**

R. S. Rubincam, formerly sales manager for the **Mine & Smelter Supply Company,** Denver, has resigned to become associated with the **Voorhees Rubber Manufacturing Company,** with headquarters in that city.

The Coffin Valve Company, Boston, Mass., has announced the appointment of **The Chapman Valve Manufacturing Company** as exclusive sales agent in the United States, Canada, Mexico and Cuba.

The Insect Electrocutor Company is the name of a new firm formed by **E. A. Lindsley,** who recently acquired the national rights to the electric insect exterminators manufactured by the **Frost Electric Screen Company,** Spokane. Mr. Lindsley will be president, **L. J. Harman,** vice-president, and **W. M. Frost,** patentee, electrical and patent engineer. The screens are used for the eradication of flies, corn borers, coldling moths, cutworms, mosquitoes and other insect pests.

Trumbull Electric Manufacturing Company, Plainville, Conn., has appointed as its representative in Los Angeles **L. V. Carr,** who formerly was connected with **Baker-Joslyn Company** and also with the **Electrical Appliance Company.**

The Jobbers' Supply Company has appointed **F. S. Baldwin** manager of its Seattle office to succeed **J. E. Richardson,** who has been transferred to Portland to have charge of the company's branch in that city.

Beardsley Manufacturing Company is the new name of the **Risdon Manufacturing Company,** which formerly was the **Novelty Manufacturing Company.** Headquarters are in Waterbury, Conn.

The Corning Glass Works, of Corning N. Y., has appointed **Tom Wood,** Polson Building, Seattle, as representative for its Pyrex power insulator line.

"Look at This and Look at That"

Ten years ago **The Electric Corporation** began business in Los Angeles in the small quarters shown at the left. Today its Los Angeles headquarters occupy the building shown on the right, and in addition it operates stores at Portland, Seattle, Oakland and San Francisco.

Ross Hartley is president of the company and **E. F. Reilly** is secretary and treasurer. **Paul H. Anderson** is Los Angeles sales manager, and **Grover A. Andersen** is sales manager of the San Francisco branch. **Albert Rivers, R. J. Cogley** and **Walter Ayden** are managers, respectively, of the Portland, Seattle and Oakland branches.

In commemoration of its tenth anniversary the company has prepared a pictorial story of its development in which are included photographs of all of the company's branches, interiors of several of their warehouses and offices, and the entire personnel in groups.

The Westinghouse Electric International Company has announced the establishment of a new branch to be known as the **Compania Electrica Westinghouse de Chile**, with activities in the countries of Chile and Bolivia. **E. L. McCloskey**, formerly manager for China of the Westinghouse Electric International Company, has been appointed manager of the new branch with headquarters at Santiago, Chile.

M. L. Fowler has been named to succeed **T. W. Carlson** as district representative of the **Benjamin Electric Manufacturing Company** in Seattle. Mr. Carlson will return to Chicago.

New Addresses

Curtis Lighting, Inc., Chicago, has announced that **F. S. Mills**, Los Angeles resident engineer, has changed his address from 3113 West Sixth Street to 909 Commercial Exchange Building in that city. **G. A. Hill**, formerly the Curtis resident engineer at Milwaukee, now is associated with Mr. Mills in the Los Angeles territory.

The U. S. Electrical Manufacturing Company recently has moved its San Francisco offices from 583 Howard Street, to 236 Fremont Street. **George Ashlock** is the factory representative. **George Curtiss, Jr.**, and **Edward Strandberg**, both formerly connected with the Los Angeles office of the company, have been transferred to the San Francisco staff.

The **Palmer Electric & Manufacturing Company**, formerly of Cambridge, Mass., has announced that it has completed the transfer of its factory from that city to Waltham.

The R. H. Edwards Electric Company of Denver recently moved to a new location at 30 : 15th Street. The former location was at 15th and Court Place, which was taken over by the enlargement of a guarantee company.

Automatic & Electric Furnaces, Ltd., has announced that it has moved its offices and works to larger premises at Elecfurn Works, North Road, Holloway, London, N. 7.

Schleicher, Inc., Gary, Ind., has opened show rooms at 132 Fourteenth Street, Oakland, Calif., for the display of Slyker air heaters. **J. L. D. Keppy** is Pacific Coast manager.

The Arrow Electric Company has moved from 1627 Fourth Avenue, Seattle, to larger quarters at 1924 Third Avenue.

The Henger Seltzer Company, Inc., has moved from 1111 Wall Street, Los Angeles, to larger quarters at 711 East Fourteenth Street.

New Equipment

Doughnut Maker

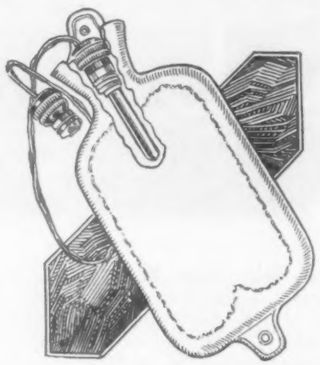
An electrical appliance for cooking doughnuts at the table has been placed on the market by **The Electrahot Manufacturing Company**, Minneapolis, Minn. The operating principle of the "Donut Maker," which has a capacity of four

doughnuts, is the same as that of the waffle iron and is operated in just as simple a manner as the toaster at the table, according to the manufacturer.

Specifications: cast aluminum baking surface; highly polished nickel finish; 7-ft. cord with 2-piece attachment plug; feed through switch; detachable heater plug at iron; height 5¾ in.; diameter over all 9 in. The device is fully guaranteed by the maker.

To Maintain Heat of Hot water Bottle

"Sta-Hot" is the name given to a simple electric unit, threaded to fit any standard hot water bottle, intended to keep the water in the bottle hot, accord-



ing to the maker, **The Clark Manufacturing Company**, 427 North 13th Street, Philadelphia. The announcement continues:

Since "Sta-Hot" is not intended to heat cold water, but only to keep hot water at a uniform temperature, it consumes very little current, approximately 25 watts. It operates on 110-volt circuit, a.c. or d.c. All the user does is to fill the bottle with water of the desired warmth, then screw in "Sta-Hot" and attach to any electric light socket or base plug. The water will remain hot all night—all day—as long as desired. "Sta-Hot" is sold at $2.50, with a two-piece socket and 9-ft. cord, in an attractively designed and colorful carton bearing full instructions for use. Attractive discounts are offered the trade.

Electric Water Heaters.—Production of a new line of electric water heaters has been announced by the **A. J. Lindemann & Hoverson Company**, Milwaukee, Wis., who describe the appliance as follows: "The circulating type is made of brass and copper, attractively finished in gray lacquer and thoroughly insulated with wool felt. The unit is nickel chromium ribbon-wound on a mica core, mica insulated and inserted in a flat copper tube. The whole is then pressed, making it compact and impossible to disarrange. Special attention has been given to the design of terminals which are pure nickel. The wiring is in rigid conduit. Element can be removed for cleaning, should occasion demand, by simply removing the top head. It is unnecessary to disconnect the switch. It is made with automatic temperature control and non-automatic for 110-220 volts and wattages from 2,000 to 5,000. An immersion type is also made for 110-220 volts and 750 and 1,000 watts."

Combination Switch Box, Supporting ing Strips and Lath Holders.—A combination product consisting of Kruse switch box supporting strips and Mansfield switch boxes with lath holders attached is being offered to the electrical trade by the **Mid-West Metal Products Company**, Muncie, Ind. The following advantages are claimed for this product by the manufacturer: It is easily assembled, consisting of only three pieces; box is supported at all four corners as strips run from studding to studding and this gives equal alignment; boxes gangable yet there is equal support for either single or ganged boxes; boxes may be placed at any desired location between studding, or may be mounted horizontally; strips are 16½ in. long but can be snipped easily for various spaces; the combination reduces stocks as this same strip will fit any make switch box with ears; passes all inspection.

Skip-Hoist Control.—A new form of **skip-hoist control** equipment has been developed by the **Industrial Controller Company**, Milwaukee. It is available in either the semi-automatic or pulley-automatic type, and the control is of the low-voltage release type. The panel and starting resistor of this control are mounted on a framework which is easily removable from the enclosure and permits of simple external wiring.

Portable Oscilloscope

The oscilloscope, a cathrode-ray oscillograph with linear time-axis designed by Dr. Frederick Bedell of Cornell University for the study of wave-form and various recurrent phenomena, is now available as a portable instrument, according to announcement of **Dr. Robert C. Burt,** manufacturing and consulting physicist, 327 South Michigan Avenue, Pasadena, Calif. The variable quantity under observation is shown as a curve with time as abscissa, stabilized by a special circuit. Freedom from inertia and negligible energy consumption makes possible, through a wide range of frequencies, results that can be obtained by no other instrument, it is claimed.

Primarily intended for electrical measurements on power and communication circuits, the oscilloscope may be used to examine any varying physical phenomena that produce proportional electrical effects, such as light or sound variations.

A new photo-electric cell, known as the Burt-Cell, also has been announced by Dr. Burt. It is claimed to be without fatigue, highly sensitive, perfectly stable, absolutely reproducible from day to day, and instantaneous in response.

Three-Heat Electric Iron

A regulating three-heat electric iron is being marketed by the **De Jur Products Company,** 199 Lafayette Street, New York City. Three little red buttons on the handle are so placed that they may be manipulated with the thumb of the hand which holds the iron, thus enabling the operator to regulate the heat and to change it instantly to get low, medium or high heat to iron flimsy, medium and heavy materials properly, the manufacturer states.

Other features of this iron are the Bakelite handle built to fit the grip of the hand and the elimination of the usual back-plug. Instead of the back-plug a connecting cord leads directly from the iron through the connecting wire to the wall socket. List price $8.50.

Electric Floor Polisher. — Landers, Frary & Clark, New Britain, Conn., have added to their Universal line an **electric floor polisher,** which retails at $37.50.

Electric Ranges.—Two new models have been added to the Hotpoint line by the **Edison Electric Appliance Company, Inc.,** 5600 West Taylor Street, Chicago. One, the No. 74, is identical in construction and appearance with the Hotpoint No. 73, with the addition of a surface unit, thus providing four surface units instead of three. It is made in three finishes—all white, semi-white and plain. The other model, No. 97, is primarily intended for use in homes with small kitchens and in apartments. It is a low-priced, compact range, with three surface units and a good-sized combination baking and broiling oven, shelf door, reversible switches, and rust-resisting oven lining. The surface heating units can be furnished either Calrod or open coil, there being one 1,800-watt unit and two 1,000-watt units. It is made in three finishes, all-white, semi-white and plain.

Bell Ringing Transformer.—George Richards & Company, 557 West Monroe Street, Chicago, recently have added to their line of Hemco bell ringing transformers a combination type, which is mounted on a 4-in. square cover. This cover is punched so that it will fit a 3¼-in. round box, a 4-in. round box, or a 4-in. square box. In addition, the cover is perforated and scored so that the rim can be knocked off to form a 4-in. round cover if desired. The transformer cover is equipped with a bushed knockout for a drop cord installation to the same outlet box, thus saving time in installation, as well as the cost of an extra outlet box.

X-Ray Floodlighting Projector.—A new weatherproof 250-watt floodlighting projector, the X-Ray "Star" No. 25, has been added to its line by **Curtis Lighting, Inc.,** 1119 West Jackson Boulevard, Chicago. This is an extra heavy steel unit, according to the manufacturer, finished with an electrolytic coating of Udylite, which prevents rust and corrosion. No. 205 is a copper projector of the same construction. The company describes this floodlighting projector as a simple, positive, focusing device, which has double control base with universal adjustment, bronze cover fasteners, and a deep-bowed, heat-resisting cover glass. The cover is pressed into a cork gasket in the housing, making it watertight in any position.

Electric Storage Water Heater.—This heater, manufactured by the **National Steel Construction Company,** Seattle, is a complete unit consisting of boiler, heating element and thermostat, with circulating system installed. It is thoroughly insulated and is encased in a metal jacket finished in white enamel, according to the manufacturer's announcement. It is equipped with fittings to connect with coil in furnace or water-back in range. The heater is guaranteed to furnish hot water at a given temperature at any minute of the day or night without any operation of switches.

Recent Publications

The Story of Globar.—This pamphlet published by the **Globar Corporation,** successor to the **American Resistor Corporation,** with headquarters at Niagara Falls, N. Y., describes the characteristics of Globar heating elements, their mountings and terminals, and gives numerous illustrations of their use in industrial applications and domestic and miscellaneous appliances.

Holophane Datalog, Edition No. 375-E.—This is the 1927 commercial edition of the general catalog published by the **Holophane Company, Inc.,** 342 Madison Avenue, New York. It lists many new lighting devices which have been developed for specific application in varied locations and contains considerable valuable engineering information on modern lighting practice. Copies may be obtained upon request.

New Wagner Motors.—Bulletins Nos. 151 and 152, respectively, set forth the advantages of the new line of air-jacketed motors and across-the-line motors manufactured by the **Wagner Electric Corporation,** St. Louis, Mo.

Oil Switches and Circuit Breakers.—Bulletins Nos. 471 and 472, respectively, published by the **Condit Electrical Manufacturing Corporation,** Boston, Mass., cover that company's oil switches and circuit breakers, types E-3, 4, 13, 14, 17 and 44 and E-20.

Controlling and Distributing Apparatus.—"Electric Power and Light Controlling and Distributing Apparatus" is the full title of catalog No. 27 published by the **Bull Dog Electric Products Company** (Mutual Electric & Machine Company), Detroit, Mich.

Automatic Transfer Switch. — A pamphlet, Form 56, setting forth the advantages of Sundh automatic transfer switches, which are "designed to perform the fundamental function of automatically transferring a load from one source of supply to another," recently has been published by the **Sundh Electric Company, Inc.,** Newark, N. J.

Rockwell Electric Furnaces.—Bulletin No. 281 issued by the **W. S. Rockwell Company,** 50 Church Street, New York, sets forth the advantages of industrial electric heating equipment and illustrates some of the types of furnaces manufactured by the Rockwell company.

Reversing Motor Planer Drive Constant Voltage Equipment.—This is the self-explanatory title of Bulletin No. 1140 published by the **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

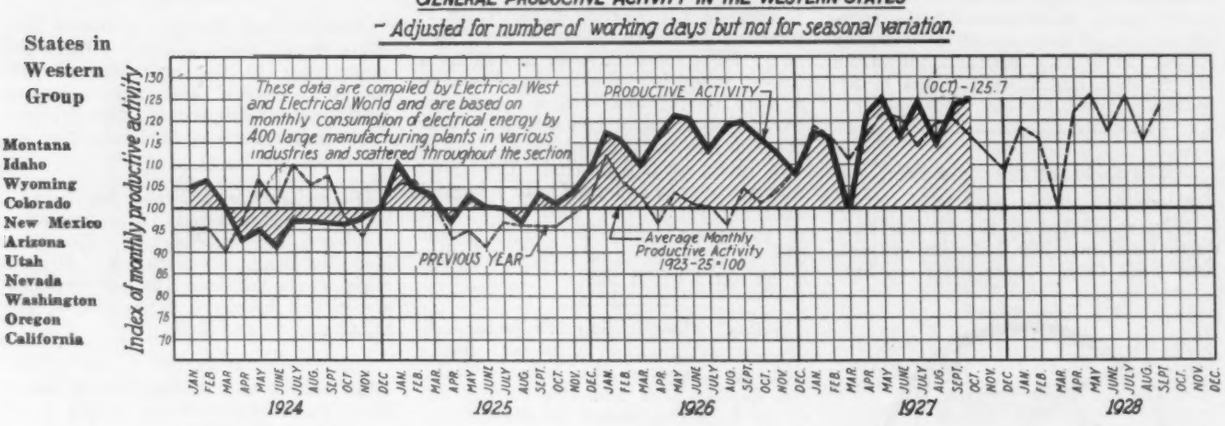
TAKEN as a whole the manufacturing plants of the Western states opened the third quarter of the year with slightly increased activities, notwithstanding the fact that past history would indicate that the continued upward trend was hardly to be expected at this season of the year. October productive activity was 0.8 per cent over September, and was also 7.7 per cent over October, 1926, the largest twelve-month gain recorded since last July. Industrial conditions in the section during October, however, were rather spotty. Some industrial groups, such as the food and kindred products, lumber and its products, and paper and pulp recorded operations over those of October, 1926, while other industries such as chemicals and allied products, metals, automobiles and shipping recorded operations under last year.

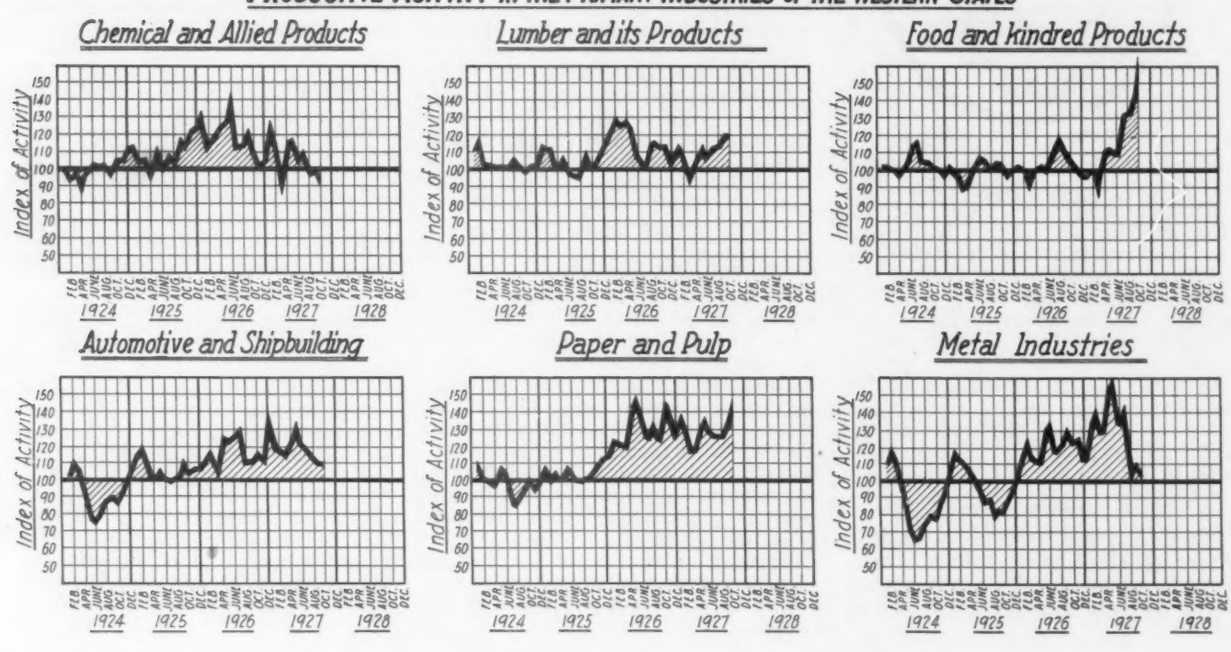
Such is the picture of industrial activity in the Western states based on the monthly electrical energy consumption of some 400 large manufacturing plants in various industries and operating in various portions of the section.

The index of activity in the manufacturing plants of the Western states stands at 125.7 for October as compared with 124.6 for September. Comparative indexes of productive activity refer to the monthly average activity for the three-year period 1923-1925 as 100, and adjusted for number of working days are as follows:

October, 1927, Western states	125.7
September, 1927, Western states	124.6
August, 1927, Western states	115.3
October, 1926, Western states	116.7
October, 1925, Western states	101.5
Average fist six months 1927, Western states	116.8
Average full year 1926, Western states	116.4
October, 1927, United States	119.9
October, 1926, United States	119.0

The present status of general industrial activity in the West bears a very close similarity to conditions of general industry in the nation as a whole. Both in the nation and in the Western section activity in the manufacturing plants is being maintained on a high plane in spite of the fact that the operations of the basic industry, steel plants and rolling mills, are materially under those of the same period last year, and have failed to witness the upward trend expected during the fall months. The high general rate of industrial activity both in the West and in the nation has been maintained through the continued activity witnessed by other basic industries such as food, lumber and paper.





FOR BETTER DISTRIBUTION

Now—Condit PK-9 an inexpensive and well designed pole line oil switch and circuit breaker, affording flexible and efficient electrical distribution as the modern motor truck has made freight distribution—it fills a long felt need in the industry.

TYPE PK-9

SPECIFICATIONS: *800 amperes or less, 7500 volts or less. Non-automatic or automatic. Manually operated. Estimated interrupting capacity: 3000 amperes at 7500 volts.*

CONDIT ELECTRICAL MFG. CORP.
Manufacturers of Electrical Protective Devices
Boston, Mass.

Represented by
H. B. SQUIRES COMPANY
Seattle, San Francisco, Los Angeles

672

CONDIT

Edison Rates Reduced

BELIEVING that a reduction in the maximum lighting rate would stimulate the use of electric appliances in the home, the Southern California Edison Company, after consulting the Railroad Commission of California and with its approval, announces a reduction from the present rate amounting to a

14% Saving

This reduction will mean a saving of 14% in the average consumer's lighting bill.

Effective for June Consumption

While the new rate will go into effect on July 1, 1927, it will be effective for June consumption of electricity. Meters read on and after July 1 measuring June use will be charged at the new rate.

Lowest Rate

While the rates now in effect on the Edison lines are lower than many other communities enjoy, this new rate will be one of the lowest in effect in the United States.

Permanence of Rate Depends on Consumer Use

This new rate is an experiment of the Edison Company and it is proposed to try it for one year. With the co-operation of all its consumers, the Company hopes that it may be made permanent.

Electricity is one of the few commodities that have decreased in cost during the past ten years. This decrease is very largely due to the constant increase in the number of uses to which electricity has been put. Two decades ago it is safe to say that not more than one woman out of ten had ever seen an electric iron, the first electric appliance to be generally accepted by the public. Today on the Edison system alone there are in excess of 312,000 electric irons in use.

Electricity is your most economical servant—USE MORE OF IT.

Southern California Edison Company

Owned by Those it Serves

What is your job for Electric Heat?

All CHROMALOX Heating Units

—are manufactured under one or more of the following

PATENTS

No. 1,133,347	Mar. 30	1915
No. 1,136,676	Apr. 20	1915
No. 1,154,953	Sept. 28	1915
No. 1,312,657	Aug. 12	1919
No. 1,398,410	Nov. 29	1921
No. Re. 15,479	Oct. 24	1922
No. 1,476,126	Dec. 4	1923
No. 1,478,465	Dec. 25	1923
No. 1,613,426	Jan. 4	1927
No. 1,614,310	Jan. 11	1927
No. 1,614,331	Jan. 11	1927
No. 1,614,938	Jan. 18	1927

OTHER PATENTS PENDING

Heating batches of compounds? Heating tanks of solutions or oils? Melting grease or metals? Heating ovens or keeping pipe lines from freezing? Or heating hard-to-heat places in the plant? Single heat or 3-heat jobs .... low heat or up to 1100 degrees F? Chromalox Units are operating on these and a hundred other jobs .... three and four years at a stretch!

Certain of the 80 sizes of Strip Heaters, 8" to 72" long .... 9 diameters of Ring Units, 3" to 11" .... or 32 sizes of Immersion Units—quickly shipped from stock—are sure to fit your applications. *Why not send along a sketch or blueprint or outline in a letter what you want electrically heated?*

The Railway Utility Company of Chicago is sole distributor of Chromalox Strip Heaters for use in heating railroad and street cars in the United States and Canada. Sole Canadian Licensee: The Canadian Chromalox Co., Ltd., 251 Queen Street, East, Toronto, Ontario, Canada

Mail with your letterhead!

Send Bulletin C-106 telling about Chromalox Strip, Space, Ring and Immersion Units, and C-108 about Chromalox Electric Heaters—Vertical, Horizontal and Portable types.

E.W.-7-27

We need Electric Heat for

_____

_____

Signed_____ Position_____

CHROMALOX HEATING UNITS

MANUFACTURED EXCLUSIVELY BY

EDWIN L. WIEGAND CO., 422 FIRST AVENUE, PITTSBURGH, PA.

Pacific Coast Representatives

ELECTRIC MATERIAL COMPANY, Inc.
589 Howard St., San Francisco - 443½ E. Third St., Los Angeles, Cal.

HARRISON SALES COMPANY
Terminal Sales Building, Seattle, Washington

Here's a $2,385,126 market for electrical equipment

THAT is the estimated size of the market for electrical equipment being created this year in the Pacific Gas and Electric Company territory.

Will you sell your share of the refrigerators, ranges, lighting units, waffle irons, electric motors, etc., to the estimated 14,091 new electric consumers being added to the P. G. and E. lines? Here's a big wealthy market in a rich State.

The Sales Department of this company creates these new consumers. For it is constantly telling through its advertising and aggressive sales work how electricity lifts the burden of drudgery from the shoulders of mankind to the tireless shoulders of the dynamo. And as new consumers are won, old consumers see the dawn of easier, happier living through the further use of electricity for lighting, cooking and refrigeration.

Industrially, any manufacturing plant that is electrified through the work of P. G. and E. industrial sales engineers also means a new market for motors, wire and other electrical equipment.

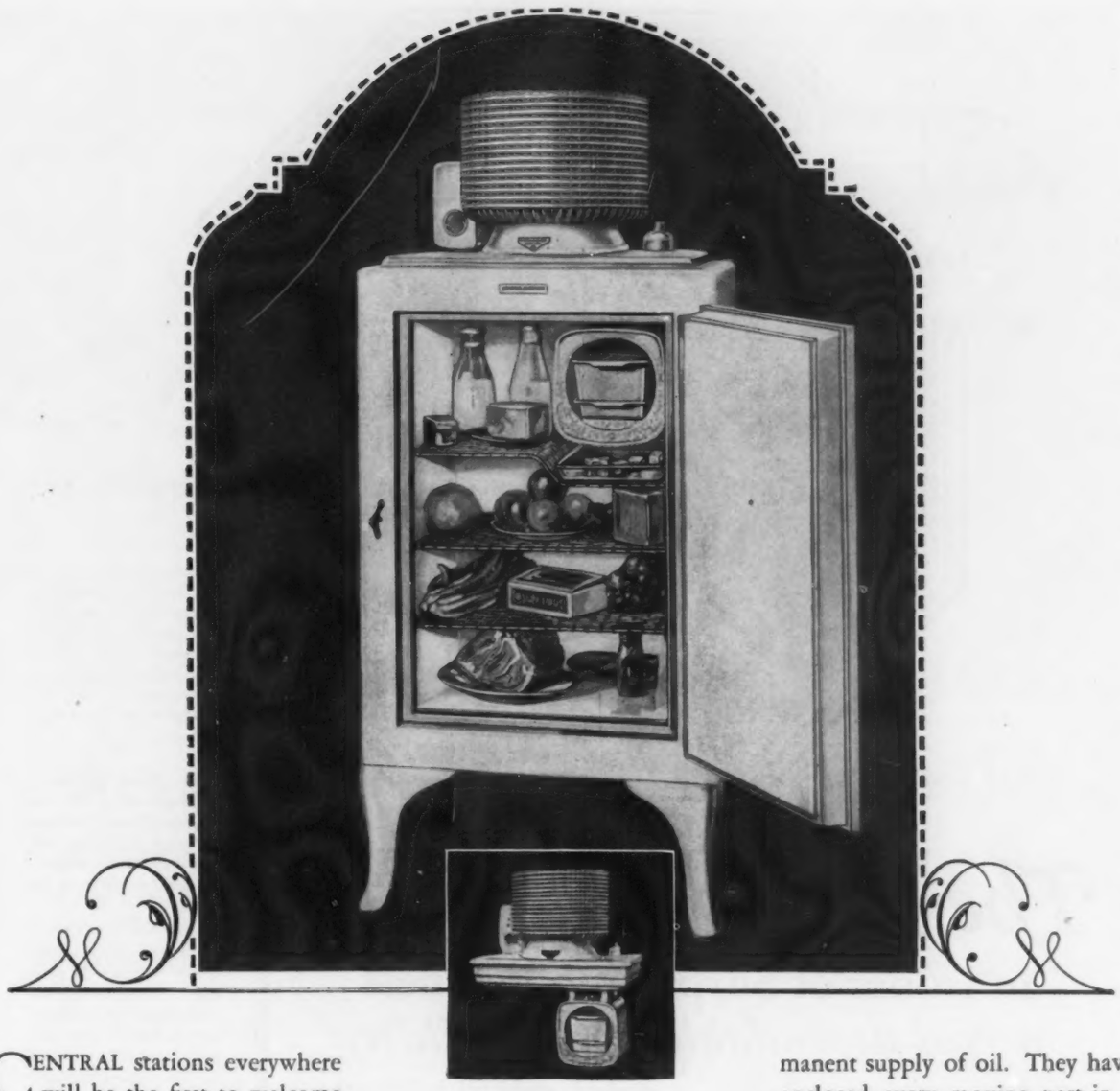
So the work of this company in reaching out and tapping new fields and loading up old fields stimulates a rich selling market for all. The Pacific Gas and Electric Company welcomes the opportunity of cooperating with manufacturers, jobbers, contractors and dealers in creating these new outlets for electrical equipment.

PACIFIC GAS AND ELECTRIC COMPANY — PACIFIC COURTEOUS CONTINUOUS SERVICE

P · G · and E ·

"PACIFIC SERVICE"

Owned — Operated — Managed by Californians



The less servicing the more profit

CENTRAL stations everywhere will be the first to welcome the remarkable simplicity of the new General Electric Refrigerator. For, in this simplicity lies satisfaction to the customer and profit to the central station.

In developing this refrigerator, the engineers of General Electric kept in mind the importance of the servicing problem. They determined to do everything possible to reduce it to a veritable minimum.

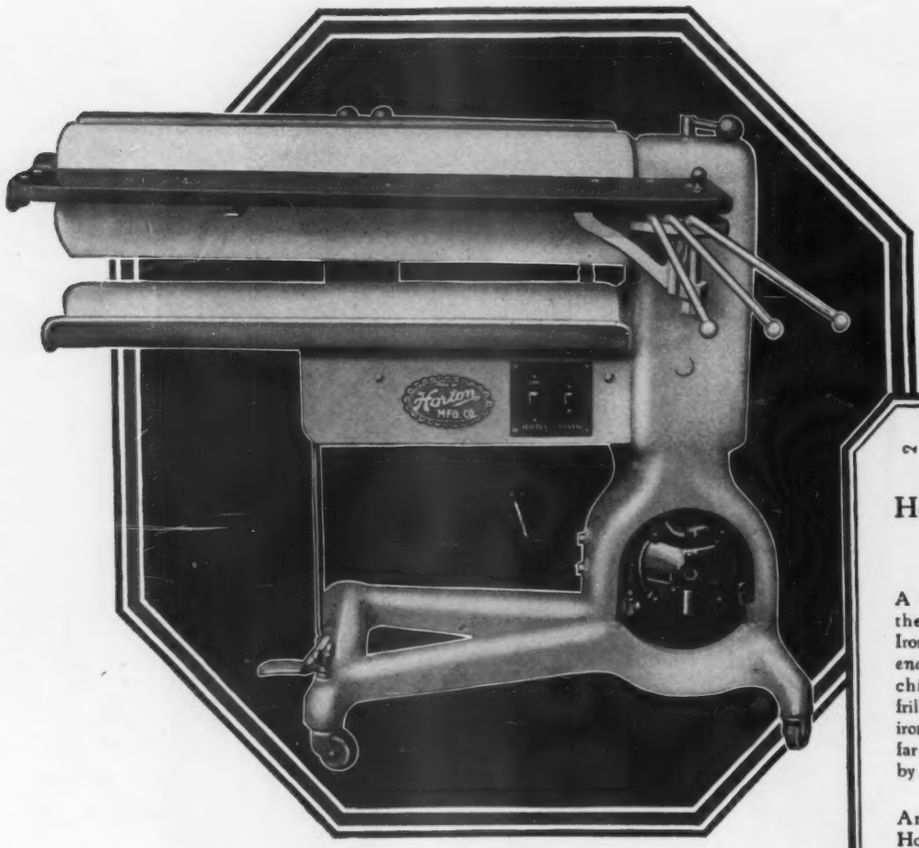
So they have constructed this modern refrigerator with no pipes, drains, belts, fans or stuffing boxes. They have provided it with a permanent supply of oil. They have enclosed every moving part in a single hermetically sealed casing that keeps efficiency in—and trouble out.

In these improvements rest some of the vital selling points of the refrigerator. And some of the factors that make for real profit to the central station that sells it.

ELECTRIC REFRIGERATION DEPARTMENT
of GENERAL ELECTRIC COMPANY
Hanna Building Cleveland, Ohio

GENERAL ELECTRIC Refrigerator

THE CREATION OF GENERAL ELECTRIC—LEADING ELECTRICAL RESEARCH ORGANIZATION OF THE WORLD



HIGHLIGHTS
on the
Horton Electric Ironer
(automatic)

A distinct advantage of the Horton Automatic Ironer is its *complete open end* ironing roll. Shirts, children's wear, dainty frills, ruffles and cuffs are ironed on this *open end* far more beautifully than by hand.

Anyone can operate a Horton — it is the one Ironer which combines practical utility, speed, ease of operation, simplicity and trouble-proof design.

The remarkable simplicity of the Horton—its noteworthy absence of complicated parts—makes it unusually easy to understand and operate, never requiring the slightest mechanical attention.

Requires but 22 x 42 inches of floor space. Roll is 30 inches long. Electric or gas heated. Electrically driven. Does not require any special wiring.

Horton MFG. CO.

The HORTON—

an Ironer of Surpassing Fineness
a real dependable Load Builder

For half a century and more, certain ideals have identified the name Horton in the minds of those whom Horton serves.

One unvarying ideal has been that each unit manufactured by Horton must be surpassingly fine—as perfect as human hands can build.

Another equally important ideal permits no compromise in materials that enter into the making of Horton products.

That these ideals have lived—have existed in practice rather than merely in mind—is evidenced in Horton's constant growth year after year.

The Horton Automatic Ironer is a material embodiment of these ideals. It is an appliance which the Central Station Company can be proud to handle and sponsor—one which through the satisfaction it gives, inspires more frequent use. As such it is a dependable load builder.

May we not send you a Horton Ironer for careful inspection, to prove its sales and load building qualities?

HORTON MANUFACTURING CO., *Fort Wayne, Indiana*

HORTON *Washers Ironers*

GOOD PRODUCTS—Yes! *and above all else* GOOD FRIENDS

Each Sale ~~ a Chain of Sales

Kelvinator's "cold that keeps" means more than keeping food fresh and wholesome. It has a significance to you as well as to your customers. For it also keeps good will—keeps customers happy in its steady, reliable service—keeps friends for you—keeps friends of Kelvinator friends coming to you— and keeps your sales growing.

For Kelvinator has the enviable service record of less than one service call per machine per year. Thousands upon thousands of Kelvinator users have never had to call for a service man, even after years of use. And few have had to have service more than once or twice.

Such excellence of performance cannot fail to gain recognition. Your customers become your friends. They sing the praises of Kelvinator to others, who in turn come to you.

When you sell one Kelvinator, you have started a chain of sales.

Kelvinator, 14205 Plymouth Road, Detroit, Mich., Division of Electric Refrigeration Corporation. Kelvinator of Canada, Ltd., 1148 Dundas St., East, London, Ontario.

Kelvinator covers the whole range of electric refrigeration service. The low-priced Model 272; Cabinet Kelvinators with cabinets by Leonard; de luxe, solid porcelain Jewett refrigerators; Kelvinator freezing tank to fit any refrigerator. A full line of equipment for every type of commercial installation.

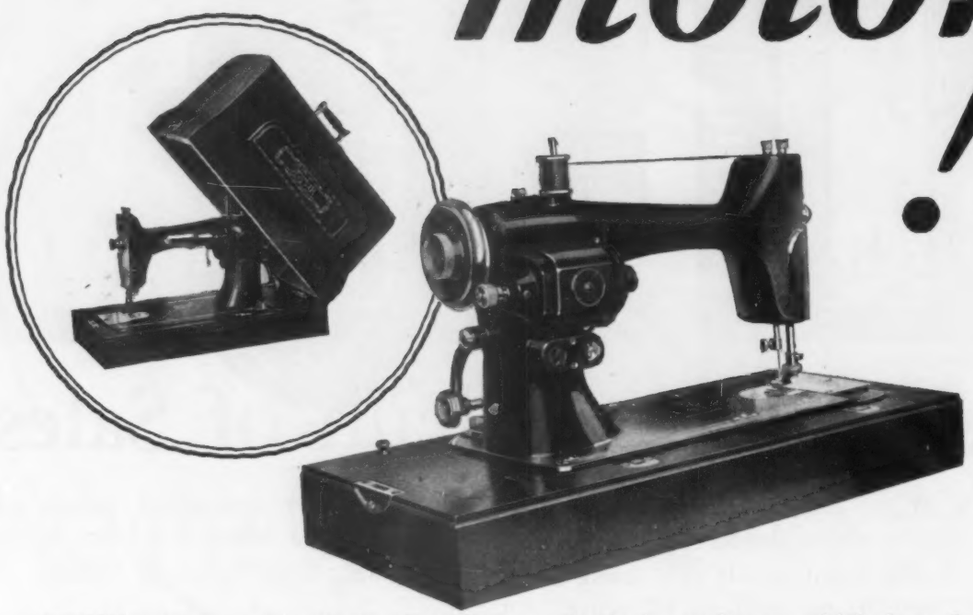
Kelvinator

Oldest Domestic Electric Refrigeration

Better Always Better

DT-603

A built-in motor!



THE sewing machine that sells easily is the sewing machine that not only works well, but looks well, too.

The built-in motor of this latest Graybar rotary model (a motor now featured in console as well as portable types) adds new excellence of line to that mechanical excellence which has always been associated with Graybar machines.

A handy needle lamp—another new feature—adds to its convenience.

Dealers who handle it report sales big—and sales resistance small. Write for information—*today!*

GraybaR

Successor to Western Electric Supply Dept.

Electrical Supplies

THE GRAYBAR TAG — SYMBOL OF DISTRIBUTION

680 Folsom St., San Francisco | 84 Marion St., Seattle, Wash. | 301-9 E. 8th St., Los Angeles, Calif. | 222-4 Ninth St., Oakland, Calif. | 152 S. Post St., Spokane, Wash. | Park & Flanders St., Portland, Ore. | 1115 A St., Tacoma, Wash.

As they Say at The Cincinnati Coffin Co.

Class 8527. Automatic A.C. Across the Line Starter with push-button control.

Write for Catalog.

Mr. Paul J. Goke, *Superintendent of the Cincinnati Coffin Company, Cincinnati, Ohio,* says

"About 4 years ago we began using Industrial Controller Automatic Starters wherever motor control was in the hands of the machine operator. They proved so satisfactory that we soon standardized on them and now have over 100 in service—Class 8527 on motors of 5 H. P and under, Class 8526 on motors between 5 and 25 H. P., and Class 8605 compensators on the larger motors. We operate on 440 volt, 60 cycle A C.

"Many steps and considerable current are saved by I-C starters, because the push button control is usually mounted on the machine convenient to the operator's hand. With hand starters the operator might have to walk 20 to 50 feet to shut off his machine or start it. As a result, he would let it run idle for 5 to 10 minutes rather than shut down and start up again. This meant the loss of many K. W. hours of current in a year.

"In 4 years' service, no I-C starter or compensator has caused any trouble. We do not even carry repair parts, and service from the Cincinnati office is so good that it is not necessary to stock up with reserve I-C equipment."

Industrial Controller Co.

MILWAUKEE, WIS. U.S.A.

San Francisco Office: C. E. Ingalls, Rialto Bldg.
Robinson Sales Co., Polson Bldg., Seattle; 53 Fourth St., Portland

INDUSTRIAL ADVERTISING
Opened the Door

MORSE pleaded with ten Congresses before his telegraph received any attention.

BELL nearly starved while the people laughed before the possibilities of his telephone were recognized.

Handicapped by a lack of prestige or influential introduction! The uphill struggles of these pioneers would have been much easier if in some way they had first gained the confidence of the minds they sought to sway.

The same situation exists in Industrial Selling. When an idea runs counter to established custom, although it be sound as gold, it needs an influential introduction to gain recognition for itself.

Morse & Bell Up to Date

A manufacturer sought to make Industry reverse its thinking and adopt a method which would revolutionize its production methods. His opposition was the groove of custom and the lack of recognition or influential approval. His allies were economy and speed in manufacture and strength in fabricated product. Nothwithstanding a meritorious idea little progress was made until the manufacturer added another ally—the sound use of Industrial Advertising.

For this purpose 3% of gross sales was appropriated. Advertising copy that especially recognized Industry's common trait to accept nothing new without careful weighing and deliberation, was persistently published in McGraw-Hill Publications reaching the industries which could profit from the new method.

Before a year was out many worthwhile installations of the revolutionary process were made. Prospective users openly stated that they eagerly watched these publications for each new advertisement in the campaign.

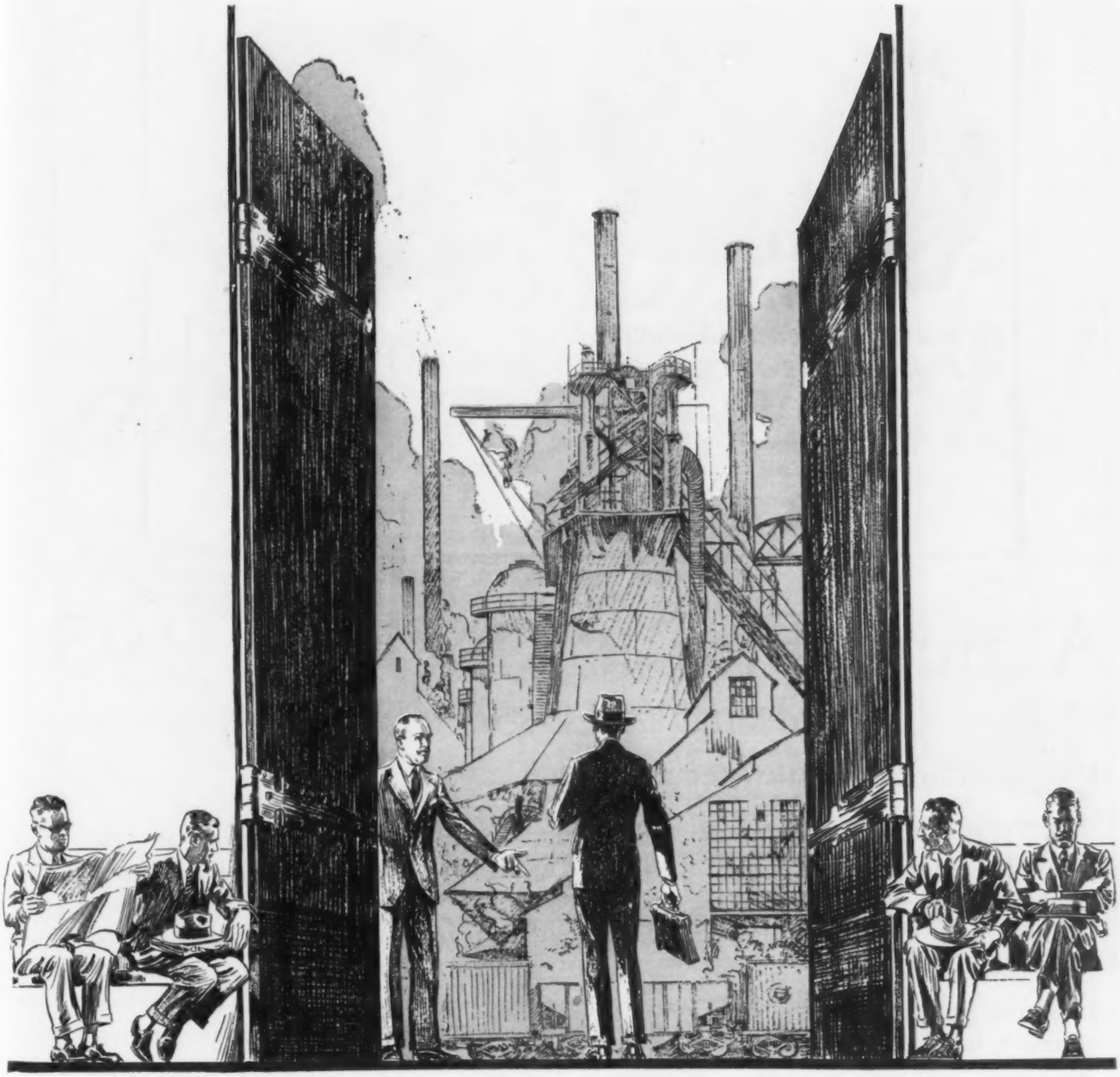
Changes An Industrial Practice

The surface is but scratched although the process is being rapidly extended. The Industrial Advertising carries on, writing on the wall another great change in industrial practice.

It is a curious anomaly that the eagerness of Industry for better products and methods is obstructed by disinterest and even suspicion when new ideas are not supported by the influential introduction that Industrial Advertising can give them.

McGraw-Hill Publications, possessing the confidence of industrial readers, provide the influential introduction which turns indifference into recognition. A study of the McGraw-Hill Four Principles of Industrial Marketing shows how Industrial Advertising holds the power to open buyers' doors and minds. McGraw-Hill, with its reservoir of data and experience, may be freely consulted by any manufacturer or his advertising agency in coping with all phases of industrial marketing problems.

A new book, "Industrial Marketing at Work," has just been published to show how to make a step-by-step application of these Four Principles. If Industry is your customer this book will help establish your advertising and selling on a foundation of certainty. Ask the nearest McGraw-Hill office to deliver a copy.



McGRAW-HILL PUBLISHING COMPANY, INC., NEW YORK, CHICAGO, PHILADELPHIA, CLEVELAND, ST. LOUIS, SAN FRANCISCO, LONDON. PUBLISHERS OF

McGRAW-HILL *Publications*

Electrical
ELECTRICAL WEST
ELECTRICAL WORLD
ELECTRICAL MERCHANDISING

Construction & Civil Engineering
ENGINEERING NEWS-RECORD
CONSTRUCTION METHODS

Industrial
POWER
AMERICAN MACHINIST
INDUSTRIAL ENGINEER
CHEMICAL & METALLURGICAL ENGINEERING

Catalogs and Directories
COAL FIELD DIRECTORY
RADIO TRADE CATALOG
ELECTRICAL TRADE CATALOG
CENTRAL STATION DIRECTORY
ELECTRIC RAILWAY DIRECTORY
KEYSTONE COAL BUYERS CATALOG
KEYSTONE COAL MINING CATALOG
ELECTRICAL ENGINEERING CATALOG
KEYSTONE METAL QUARRY CATALOG
ANALYSIS OF METALLIC AND NON-METALLIC MINING, QUARRYING AND CEMENT INDUSTRIES
BONBRIGHT SURVEY OF ELECTRIC POWER & LIGHT COMPANIES IN THE U. S.

Radio
RADIO RETAILING

Transportation
BUS TRANSPORTATION
ELECTRIC RAILWAY JOURNAL

Mining
COAL AGE
ENGINEERING & MINING JOURNAL

Overseas
INGENIERIA INTERNACIONAL
AMERICAN MACHINIST
(EUROPEAN EDITION)

45,000 ADVERTISING PAGES USED ANNUALLY BY 3,000 MANUFACTURERS TO HELP INDUSTRY BUY MORE EFFECTIVELY

This advertisement appears in the July 2nd edition of the Saturday Evening Post

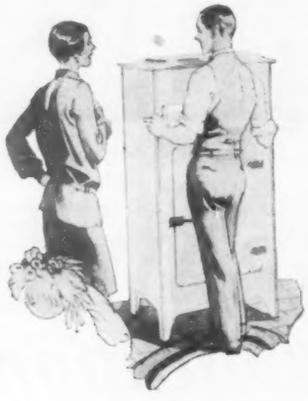
A new FRIGIDAIRE for $195

FRIGIDAIRE, *already the fastest-selling electric refrigerator, now extends its market to reach every home . . . .*

WITH this latest addition to the line, Frigidaire offers a still greater merchandising opportunity to the public utility company holding the Frigidaire franchise.

Now practically every home with electric current represents a Frigidaire prospect. And into every one of those homes goes Frigidaire advertising — daily, weekly, or monthly.

Write for information about Frigidaire. Let us show you what is being done in your territory—what has been done, and what will be done in the future to increase the sales of Frigidaire.



Let us show you specifically how the Frigidaire franchise is your greatest opportunity for sales in your appliance department and a substantial increase in load on your lines.

FRIGIDAIRE CORPORATION
Subsidiary of General Motors Corporation
Dept. I-73 Dayton, Ohio
Public Utilities Division
285 Madison Avenue, New York City, N. Y.

FRIGIDAIRE

PRODUCT OF GENERAL MOTORS

2 new *accessories and sales points!*

The Dryer-Heater retails at $8.00.

CONVENTION COMMENT

The 50th Convention of the N.E.L.A. made it possible for us to greet old friends as well as to make many new friends. For this, we are deeply grateful.

In addition, we are grateful for the magnitude and the multitude of the exhibits and for the intense interest manifested in them by the delegates.

Truly, it was indeed both a privilege and a pleasure to have participated in such an epoch-making Convention.

LONG ago the Premier Duplex proved itself in competitive tests to be the quickest and most thorough cleaner made. And now in adding these two new accessories, it goes a step further and proves itself to be the most all-around useful cleaner as well.

Wherever the new Floor Polisher and Dryer-Heater accessories have been shown, they have been eagerly bought. Today every woman is anxious to have gleaming, bright floors in her home and with the Floor Polisher she can have them with but a few minutes' easy work. And with the new Dryer-Heater she can dry out damp clothes quickly, heat a room, and dry her hair after a shampoo. Here are two new accessories that women are sure to value. And you will value them, too. For not only will they help you sell more Premier Duplex cleaners—sell them more quickly and easily—but also they will bring back your old Premier Duplex customers for additional buying.

Premier Duplex

ELECTRIC VACUUM CLEANER CO., INC.
Cleveland, Ohio

Manufactured and distributed in Canada by the Premier Vacuum Cleaner Co., Ltd., General Offices, Toronto.

The Floor Polisher retails at $10.00.

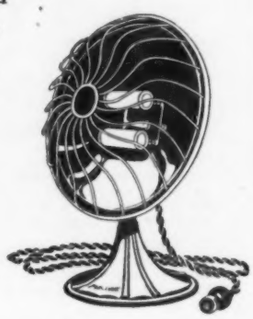
We would like to tell you more about these 2 new accessories. And if you are not already a Premier Duplex dealer, now is the time to find out about the franchise and get ready for the big Fall selling season.

Controlled Electric Heat

by
Automatic
Thermostat
Control

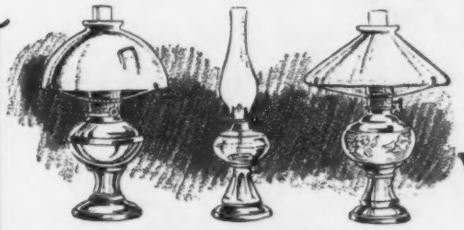
The Latest MAJESTIC *Triumph*

Until the perfection of the Majestic Automatic Thermostat, inadequate control and operating cost were the big obstacles to heating by electricity. Electric heating was unharnessed, like a radio without dials. But now Majestic engineers have overcome this last and final "fly in the ointment" by perfecting this remarkable new device which accurately controls the amount of current consumed by the heating units. Now electric heat can compete favorably with other fuels on their last remaining argument—cost of operation. The Majestic Automatic Thermostat Control accurately and unfailingly keeps the heat of the room at the designated temperature—turns the current off and on as the thermometer rises and falls. Installed with Majestic high-wattage wall-insert or portable electric heaters, this new invention brings electric heating to perfection. We will gladly furnish you with complete details.



MAJESTIC ELECTRIC APPLIANCE CO., Inc.
SAN FRANCISCO KANSAS CITY PHILADELPHIA

Back in 1890



When even the finest homes still used kerosene lamps—

Long before electric lights came into general use; when the automobile was still a tinkerer's toy; a quarter of a century before radio was even thought of, the Indiana Rubber & Insulated Wire Company began its career.

We have literally "grown up" with the electrical industry. And we have kept pace with every forward move; clinging always to old-fashioned ideals, yet ever ready to accept *new-fashioned* ideas.

Today PARANITE—our trade name for rubber covered wire—is the result of 37 years of experience and experiments. "You can *depend* on PARANITE" has become a recognized phrase in the electrical industry.

INDIANA RUBBER & INSULATED WIRE COMPANY
JONESBORO, INDIANA

811 Marquette Bldg.
Chicago, Illinois

63 Vesey Street
New York City

Western Representative

H. F. Boardman
400 Hibernian Bldg., Los Angeles

Walter I. Ferguson & Company
208 Baltimore Bldg., Kansas City, Mo.

Warehouse stocks Dallas, Texas; Denver, Colorado

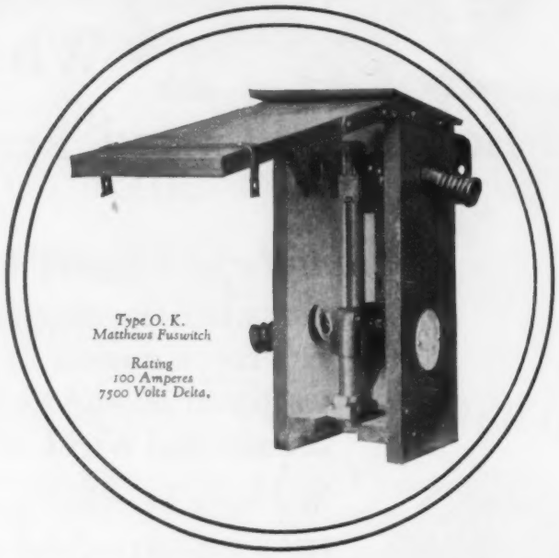
If it's

PARANITE

it's Right

Easy to Inspect

and re-fuse



Type O. K. Matthews Fuswitch

Rating 100 Amperes 7500 Volts Delta.

Matthews Fuswitches are low in price and high in Electrical Values and Safety features.

There are 29 different kinds and combinations to cover all needs from 300 Amperes down and 15,000 Volts and less.

You can now get a complete series of Fast Blowing Matthews Fuse Links that will blow within 15% of their marked rating on overloads and that will not heat above 210 degrees. Full data on them in Bulletin 502.

The door of the Matthews Fuswitch lifts upward, fastening automatically when nearly horizontal, and providing a protective covering for the open box. No part is on the door. There are no holes in the door so that driving rain cannot get in when it is closed. Instant and thorough examination of the entire box and contents is possible without interruption of service. Re-fusing consists merely of pulling cartridge from friction contact at the top—permitting easy removal. To reload, merely drop base of cartridge into hinge loop and push top into place. The entire operation is accomplished with the Matthews Safety Fuse Puller.

By substitution of a Matthews Disconnecting Blade for the patented vacuum fuse cartridge, the Matthews Fuswitch gives perfect protected service without need for warehousing extra switches. In addition to Fuswitches, you need only to stock Disconnecting Blades.

Bulletin 502 explains why Matthews Fuswitches represent the outstanding triumph in fuse switch and disconnecting switch equipment. Write for it today.

W. N. MATTHEWS CORPORATION

Engineers and Manufacturers

3708 FOREST PARK BLVD. ST. LOUIS, U. S. A.

Offices In All Principal Cities

Your Electrical Distributer Can Supply Them To You

MATTHEWS FUSWITCHES

and DISCONNECTING SWITCHES

INTERCHANGEABLE

100

EASY TO PULL CONDUCTORS

They have unobstructed cover openings; therefore, it is easy to pull conductors without injury to them.

The New Obround CONDULET

The Latest and Greatest Condulet Development

For other Distinctive and Novel features and listings of the New Obround Condulets, see Catalog No. 2100

CROUSE-HINDS COMPANY

ESTABLISHED 1897

SYRACUSE, N. Y., U. S. A.

Sales Offices

PHILADELPHIA · PITTSBURGH · NEW YORK · DETROIT · CINCINNATI · CLEVELAND · ATLANTA · BOSTON · CHICAGO · ST. LOUIS · SAN FRANCISCO · MINNEAPOLIS · MILWAUKEE

CH 276

"BETTER THAN EVER!"

The New Sleek-finish (WAX SURFACED)

DURADUCT

Reg. U. S. Pat. Off

The Fast Fishing Single Wall Loom
Cleaner to Handle!

Free Samples? Sure!

Send us your name and we'll send you a good long sample of Duraduct to try on your next wiring job.

Samples are *free*, but they aren't any *free*-er than the free fishin' you get through sleek-finish Duraduct.

DURABILT PRODUCTS

REG. U.S. PAT. OFF.

C. DENT SLAUGHTER

Pacific Coast Representative

314 12th Street, San Francisco 324 N. San Pedro St., Los Angeles

Stocks carried at all coast jobbing centers

Noark

There is no chance of weakness — and consequent failure — in a

Noark Fuse

Every element that has anything at all to do with the accuracy and dependability of the performance of these fuses has been designed with scientific exactness.

The diameter, the thickness and the strength of the tubes—all are determined with mathematical precision.

The character of the filling is established by an exact law of chemistry.

The size and materials in the terminals are based on proven physical formulae.

And the design, shape and metallurgy of the fusible elements — all are fixed with technical exactitude.

Nothing could be more dependable — nothing more capable of successful protection —

These are the reason why Noark Fuses never fail to

"Blow on the Dot"

COLT

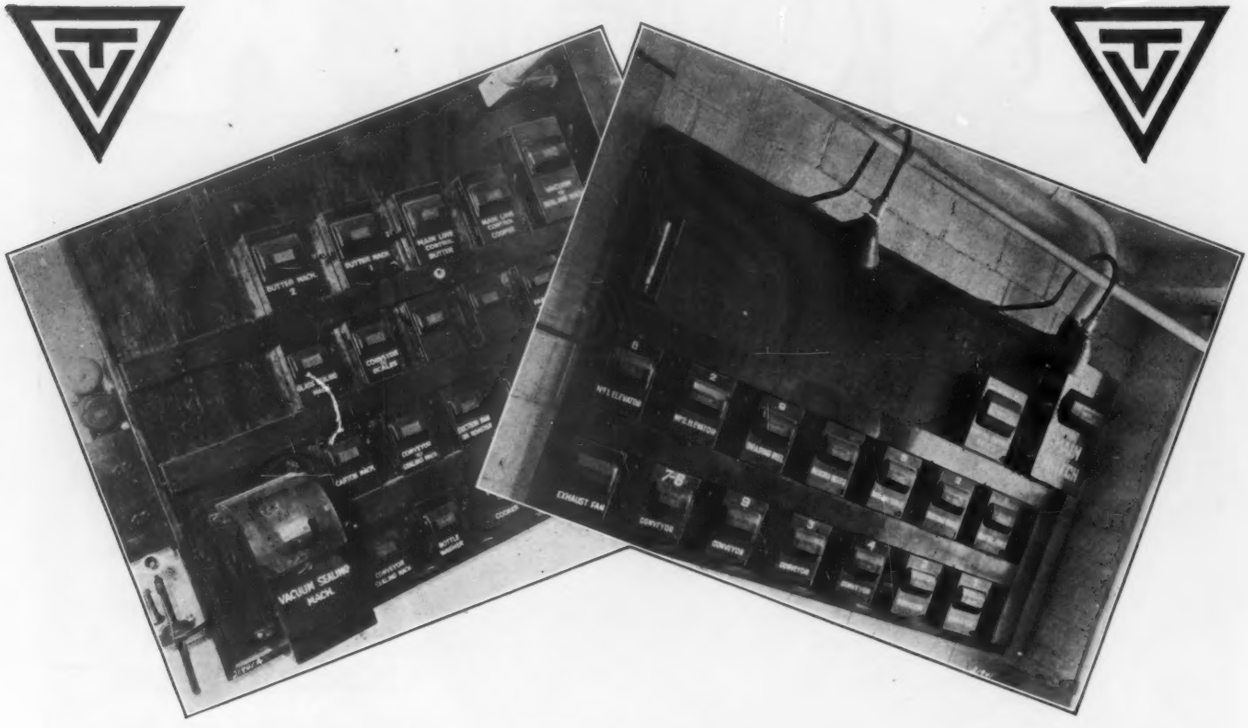
COLT'S PATENT FIRE ARMS MFG. CO.
Electrical Division
HARTFORD, CONN. U. S. A.
NEW YORK - BOSTON - CHICAGO - SAN FRANCISCO

33-F-24

Noark Fuses are made in all sizes and capacities, in ferrule or knife blade types, with or without indicators.

Send for Catalog No 55.

Far-Western ALLIED *Distributors for*



The California Almond Growers Exchange Chose T-V Safety Switches

Two views of a complete T-V Type A installation in the California Almond Growers Exchange at Sacramento. You can rely on Trumbull-Vanderpoel Safety Switches to handle all types of load in factories, mills and shops.

The increasing number of complete T-V installations for power, light and heat loads offers ample proof that "Protection Service" switches are safe and satisfactory in electrical operation and mechanical construction.

TRUMBULL-VANDERPOEL
ELECTRIC MFG. CO.
Bantam, Conn.

ALLIED INDUSTRIES, INC.

San Francisco Los Angeles Oakland Portland Seattle

Nationally ALLIN *Known Products*

One More Reason for "BUCKEYE" SUPREMACY

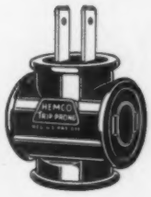
All threads are evenly cut on the most efficient machines and by the most highly skilled workmen to be found. This is just one more reason why "Buckeye" Conduit is used in most of the better wiring jobs throughout the country.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Youngstown, Ohio

Set this Collyer Cord Display on your counter, it will help you to sell more cords. It is a strong black enamelled rack holding ten colorful spools of Collyer Cord. Easy to handle. Keeps cords clean.

Ask how to get one of these racks free.

COLLYER
INSULATED WIRE COMPANY
Pawtucket, R. I.



HEMCO

Hemco products have acquired a wide reputation for quality and long life service. They will help you to increase your profits.

GEORGE RICHARDS & CO., INC.
557 West Monroe St., Chicago

Floor Outlets

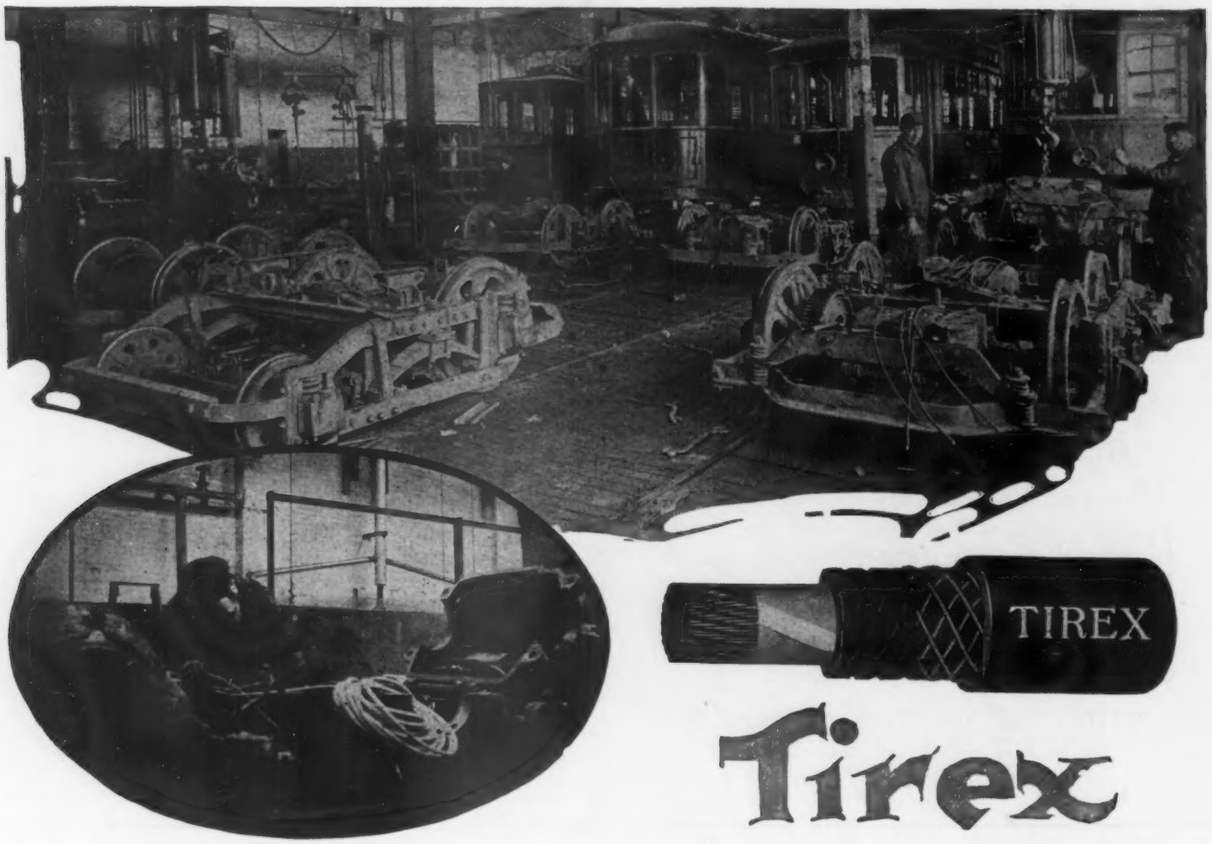
The Steel City Electric Company are pioneer manufacturers of Fullman Floor Outlets.

These products have been used for years in the largest electrical installations everywhere and have gained an enviable reputation with leading architects of the world.

Steel City Electric Co.
PITTSBURGH PENNSYLVANIA

ALLIED INDUSTRIES, INC.

San Francisco Los Angeles Oakland Portland Seattle



TIREX Motor Lead Cable being installed on railway motors at the Washington Railway & Electric Co., Washington, D. C.

Tirex

—the cable to specify for motor leads

Electric railways are regularly using TIREX Motor Lead Cable because they find it eliminates the costly cable lead troubles as one of their problems.

Electric railway engineers were quick to learn the admirable qualities of TIREX Cables for motor leads. *And any cable that will stand the rugged service required in electric railway operation, is a good cable to specify for your own motor leads.*

TIREX is as flexible as a rubber hose. Note the multiplicity of fine wires which make up the copper conductor. The conductors are insulated with a high grade rubber compound and the cable is protected by TIREX "rubber armor" which is almost wear-proof and satisfactory for all kinds of rough work.

Notice, too, the special feature which distinguishes TIREX Motor Lead Cables from the regular line of TIREX Cables, the paper tape between the copper and rubber. "Skinning" cable for connections is easy because when the insulation is removed the conductor is left clean, ready for connecting to motor terminals.

Get all the facts on this splendid indestructible cable.

Use the coupon.

SIMPLEX WIRE & CABLE Co

MANUFACTURERS

201 DEVONSHIRE ST., BOSTON

New York Chicago San Francisco Cleveland Jacksonville

Simplex Wire & Cable Co.,
201 Devonshire St., Boston, Mass.

Gentlemen:—

Please send me the Simplex Manual. ☐

Please send quotation on Tirex Motor Lead Cables. ☐

Size.....No. of Conductors.....

Voltage..... Feet.....

Name .....

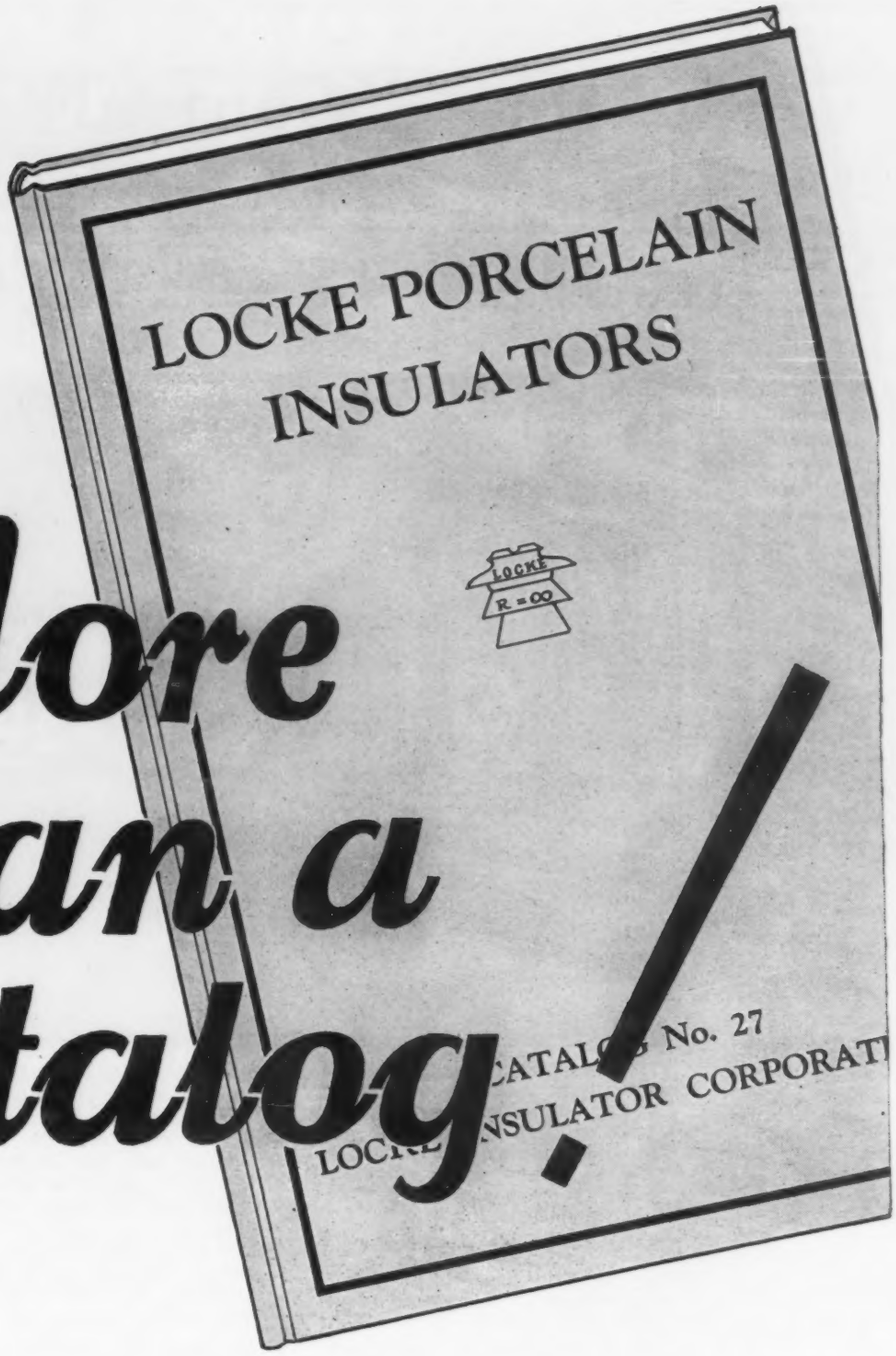
Position .....

Company .....

Address .....

City .....

State .....



More than a Catalog!

This book is more than a mere catalog. It is an invaluable textbook to any executive who is in any way concerned with high voltage transmission. If you have not yet received your copy, your name and address on a post-card will bring it to your desk.

LOCKE INSULATOR CORPORATION
BALTIMORE MARYLAND

Pickling "Central" Pipe

For

"Central Black" and "Central White" Conduit

This is No. 7 of a series showing operations in the making of "Central" Conduit.

Conduit Pickling Room in the Central Plant

AFTER being threaded, "CENTRAL" pipe is transferred from the pipe mill to the conduit pickling room by an electric truck, from which the pipe is picked up by an overhead crane and securely locked in a large cage.

These cages, loaded with pipe in vertical position, are carried by the crane and then immersed in a cleaning solution which removes all oil and grease from the pipe.

The loaded cages are then transferred to acid vats, where the scale is removed by slow, careful pickling, while the pipe is agitated to insure uniform action of the acid on all parts of the pipe. Special skill and care are required in this operation to prevent injury to the threads by acid.

The pipe is next placed horizontally on inspection benches and all loose scale is blown from the inside by compressed air. The exterior is examined under powerful lights to detect any possible defects in surface or threads, and a light is placed at one end of each piece of pipe, to enable the inspector at the other end to examine the interior for possible obstructions.

Any piece of conduit in which the slightest defect is observed is rejected and scrapped. The pipe that passes examination is rolled into an adjoining building where it is finished into "CENTRAL WHITE" or "CENTRAL BLACK" Conduit.

PITTSBURGH, PA.

An OKONITE Product

OKOCORD

FLEXIBLE PORTABLE CORD & CABLE

Okonite Products

OKONITE INSULATED WIRES AND CABLES

VARNISHED CAMBRIC CABLES

OKONITE INSULATING TAPE

MANSON & DUNDEE FRICTION TAPES

OKONITE CEMENT

OKOCORD

OKOLOOM

Okonite-Callender Products

IMPREGNATED PAPER CABLES

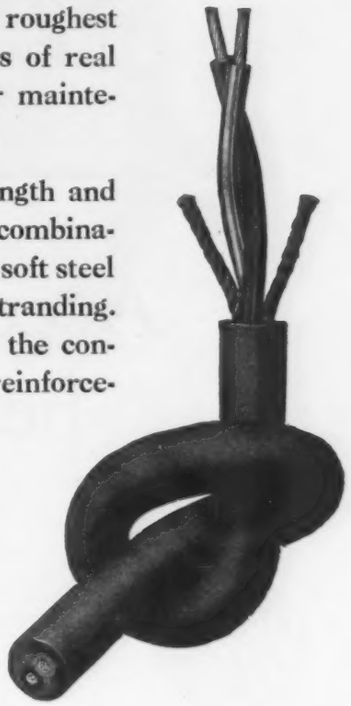
SUPER-TENSION CABLES

SPLICING MATERIALS

The best hard service flexible cord for rough usage!

A cord that will last, a cord that will resist moisture, oils, greases, acid and alkali fumes, a cord that will withstand the roughest usage, a cord that will give years of real service, a cord that means lower maintenance costs—that's OKOCORD.

Great flexibility, high tensile strength and full conductivity are insured by a combination of annealed tinned copper and soft steel wires assembled in a regular stranding. Seine twine threads twisted with the conductors form a highly efficient reinforcement. OKONITE insulation is used throughout.

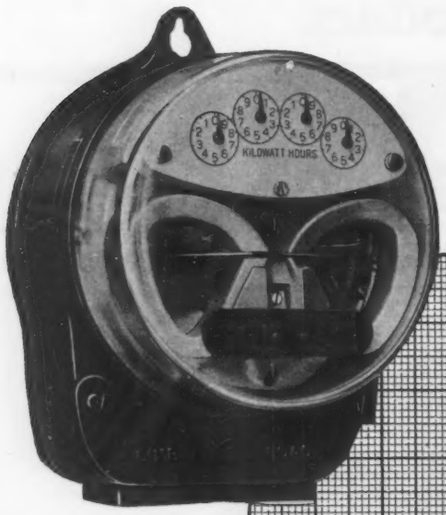


Learn how Okocord cords and cables can lower maintenance costs for you. Write us for complete data.

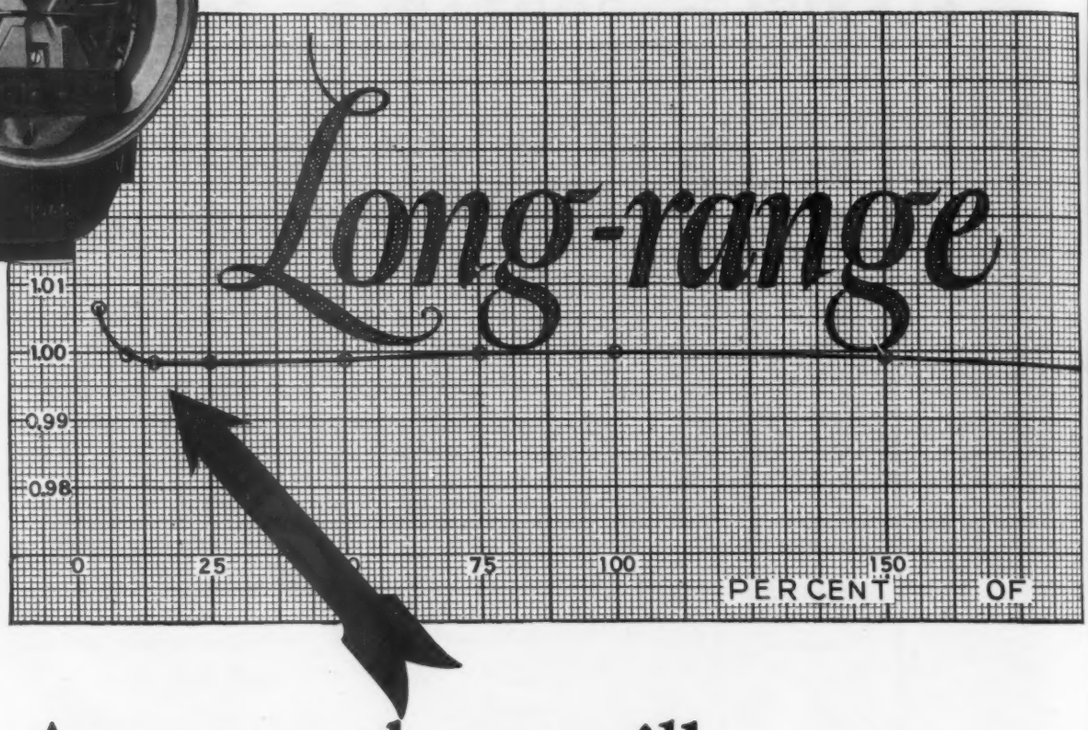
THE OKONITE COMPANY
THE OKONITE-CALLENDER CABLE COMPANY, INC.

Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES: NEW YORK CHICAGO PITTSBURGH ST. LOUIS ATLANTA BIRMINGHAM SAN FRANCISCO LOS ANGELES SEATTLE
Pettingell-Andrews Co., Boston, Mass.
Novelty Electric Co., Philadelphia, Pa. F. D. Lawrence Electric Co., Cincinnati, O.
Canadian Representatives: Engineering Materials Limited, Montreal
Cuban Representatives: Victor G. Mendoza Co., Havana



Type I-16 Watthour Meter



Accuracy here will be maintained, because—

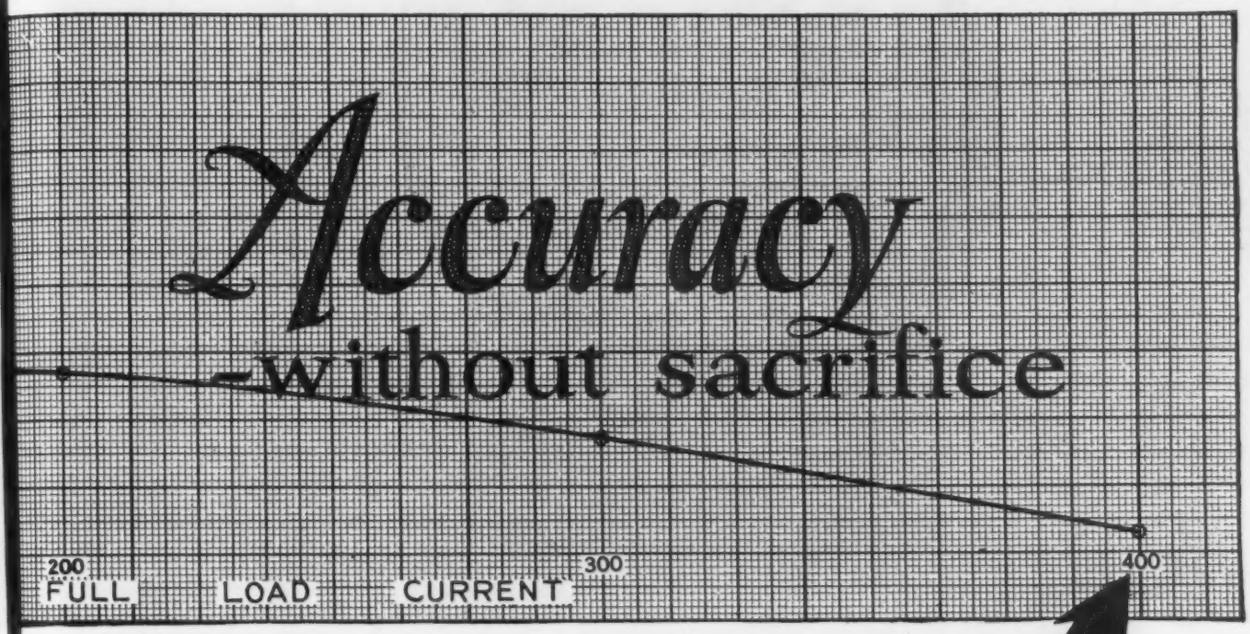
It is not enough for a watthour meter to be accurate on light load when first installed. It must remain so for years without attention so that it will faithfully record the very light loads to which it is subjected.

This sustained light-load accuracy is dependent upon a high torque to overcome the detrimental effect of friction-increase at low loads.

A study of *all* the characteristic curves of the I-16 meter will convince you of its supremacy. You can get these facts from your G-E Office.

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.



high torque was not sacrificed to get this

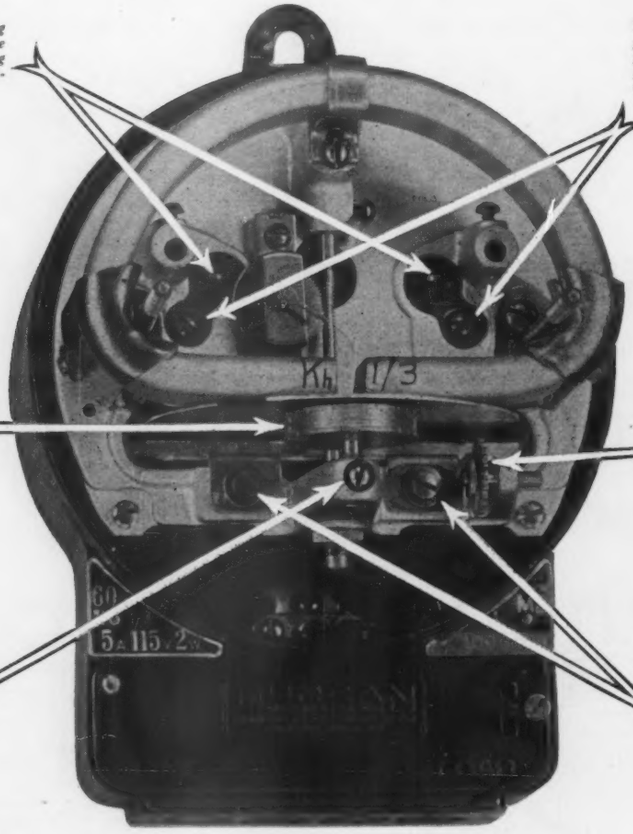
Therefore, its high torque, which has not been sacrificed to obtain over-load accuracy, gives the I-16 meter an indisputable advantage.

Moreover, its high accuracy on overload, which is attained without sacrificing accuracy under varying conditions of temperature, voltage, power factor, and frequency, gives the I-16 meter increased carrying capacity.

600-9

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES



After loosening the clamping screws, these ears or lugs may be moved up or down, thus altering the phase or quadrature adjustment.

These clamping screws secure the phase adjustment. Loosening only part of a turn is sufficient to permit movement of the adjustment plate.

Arrows, and the letters F and S, stamped on the periphery of the soft iron full load adjustment screw, indicate the proper direction it should be moved in calibration. Graduations are also provided, one division indicating approximately one per cent change in full load speed.

The light load adjustment is accessible from the front of the meter. Arows and the letters F and S indicate the direction of motion in calibration. Radial slots permit the use of a screwdriver in setting the adjustment if desired.

The full load adjustment is locked by means of this "full load clamping Screw."

The light load adjustment is locked by means of these two clamping screws.

the Same Simple *and* Accessible Adjustments

in the new

The adjustments of the Type MD meter are practically identical with those of the M2, the preceding model and are all accessible from the front of the meter and are positive in their action. The full and light load adjustments are of the micrometer type and their design is such as to eliminate lost motion. Notice the light finish of the permanent magnet (the M2 magnet was finished in black) and the placing of the KH constant on the poles where it is immediately drawn to the attention of the tester.

Other interesting details of this meter will appear in further advertisements of this series.

Type "MD"

DUNCAN *Watthour Meters*

GEORGE L. HOFFMAN
202 Oregon Bldg.,
Portland

A. F. BLECKSMITH
547 Douglas Bldg.,
Los Angeles

DUNCAN ELECTRIC MANUFACTURING COMPANY, LAFAYETTE, INDIANA

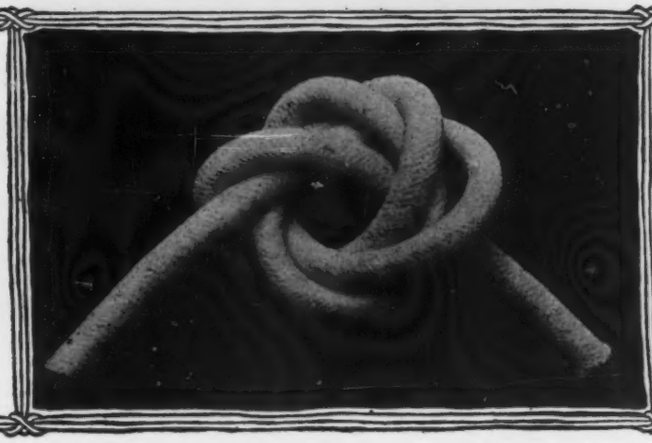
ROCKBESTOS

-the asbestos covered wire

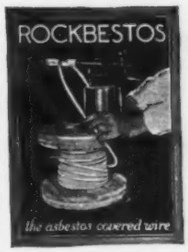
Here it is—the extra flexible

Rockbestos Motion Picture Cable

You will find it on all the leading projectors, arc lights, sun arcs, high intensity lamps —wherever heat is.



You can tie it in knots! And it will not crack, nor break and the surface remains intact—practically forever.



Nothing better can be used for wiring from panel boards to rheostats—just try it. Would you like a piece to tie in a knot? We'll send it. Just a card will bring it.

When you buy M. P. Cable ask for Rockbestos —the extra flexible.

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN, CONN.

On the Pacific Coast—Allied Industries, Inc.

THE FIBRE CONDUIT CO. REG. U.S. PAT. OFF. ORANGEBURG ORANGEBURG, N.Y.

ORANGEBURG FIBRE CONDUIT

THIRTY YEARS of underground service has proved Orangeburg permanence. Over 200 million feet in service in all parts of the world.

JOHNS-MANVILLE CORPORATION, MADISON AVE. AT 41ST ST., NEW YORK
BRANCHES IN ALL LARGE CITIES
FOR CANADA: CANADIAN JOHNS-MANVILLE CO., LTD., TORONTO

Through— Electrical Materials FOR Utilities Jobber Contractor AND Dealer

JOHNS-MANVILLE

SOLE SELLING AGENT
for
THE FIBRE CONDUIT CO., Orangeburg, New York

G-E Relays

IA

Induction Type

These current and voltage relays combine the following features:

Accuracy	Low friction
Consistent operation	Large current capacity
High torque	High contact pressure
Low energy	Simplicity

Indicating Target

Type IA Relays are only part of the contribution which G-E relay specialists have made to the protection of equipment and the control of distribution systems. These specialists are available to assist protection engineers in the solution of relay problems.

G-E SWITCHBOARD EQUIPMENT

Air Circuit Breakers
Stationary Switchboards
Outdoor Station Equipment
Switchboard Accessories and Devices

Relays
Oil Circuit Breakers
Truck-type Switchboards
Automatic Switching Equipment
Switches

501-8

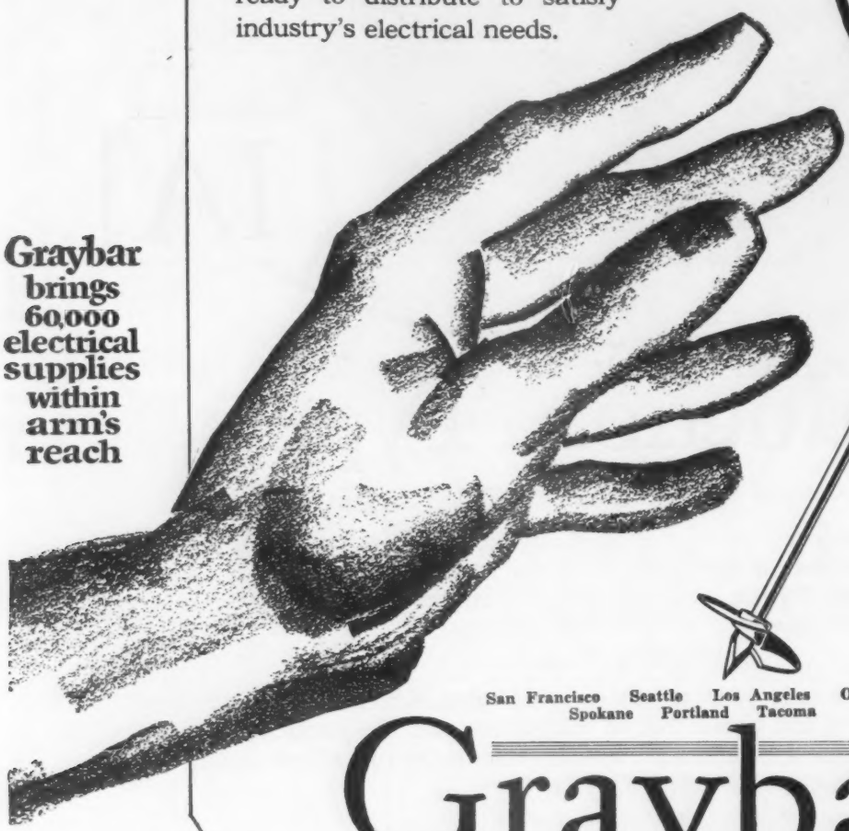
GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Within arm's reach – line material, too

Guy anchors? Yes. Tools? Yes. And every other line material item? Yes—they are all brought within arm's reach by Graybar's 60 distributing houses.

And they are all quality products, backed by Graybar's 58 years of experience—as are all the rest of the 60,000 electrical supplies that Graybar holds ready to distribute to satisfy industry's electrical needs.



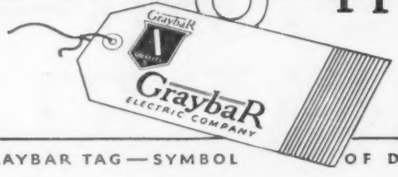
Graybar brings 60,000 electrical supplies within arm's reach

San Francisco Seattle Los Angeles Oakland
Spokane Portland Tacoma

GraybaR

Successor to Western Electric Supply Dept.

Electrical Supplies



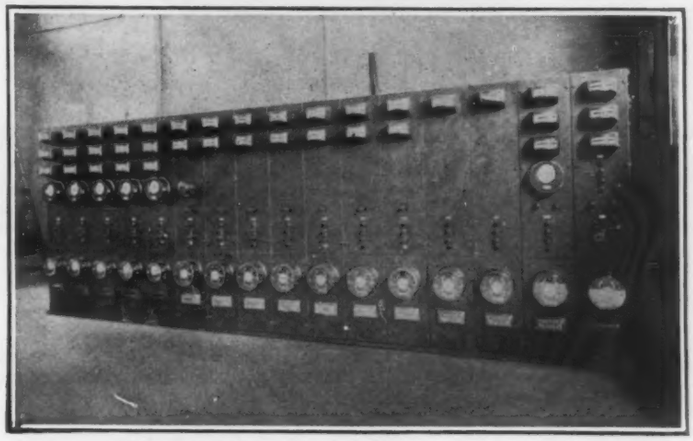
THE GRAYBAR TAG—SYMBOL OF DISTRIBUTION

THE PULSE *of your* FEEDER SYSTEM

exact conditions
Known because taken by

TRADE MARK
BRISTOL'S
REG. U. S. PAT. OFFICE.

RECORDING VOLT METERS



Bristol's recording voltmeters used on feeder circuits by Southern Public Utilities Co., Charlotte, N. C.

A glance at the board and instantly the operator can feel the pulse of the whole feeder net work. This is excellent practice for analyzing actual performance and keeping a check on load distribution through feeder lines. The illustration shows the board of the Elizabeth Ave. station of the Southern Public Utilities Company, Charlotte, N. C. which has a Bristol's Recording Voltmeter on each set of feeders.

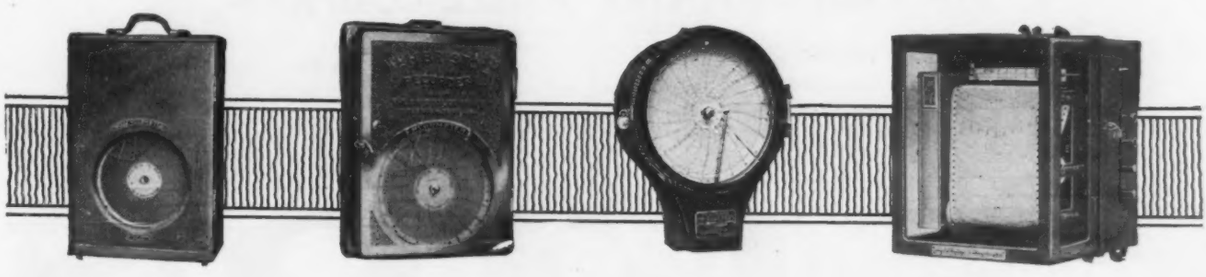
Bristol's Recording Instruments are of simple, rugged design, notable for sustained accuracy under all service conditions; at the central station, substation and on transmission lines. Furnished in a variety of models for stationary and portable use.

Other Bristol Instruments

- Pressure Gages
- Voltmeters
- Ammeters
- Wattmeters
- Millivoltmeters
- Shunt Ammeters
- Frequency Meters
- Vacuum Gages
- Liquid Level Gages
- Thermometers
- Pyrometers
- Temperature Control
- Psychrometers
- Time Recorders
- Tachometers
- Revolution Counters
- Long Distance Transmitting System
- Radii Averaging Instruments

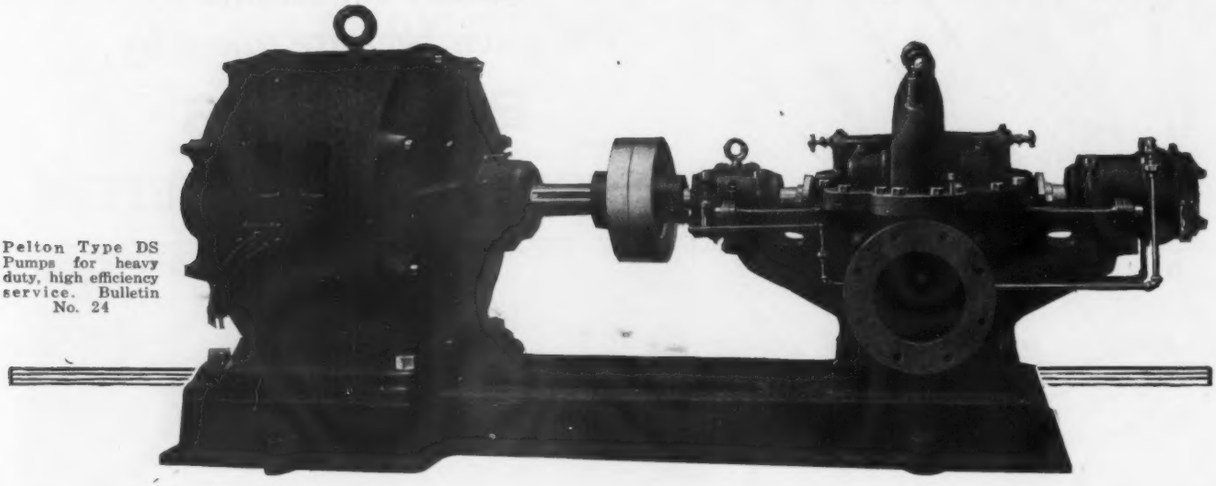
FOR 36 YEARS Ask Any Technical Engineer MAKERS OF
BRISTOL'S RECORDING INSTRUMENTS

The Bristol Company, Waterbury, Connecticut



PELTON

A Pelton Pump for Every Service

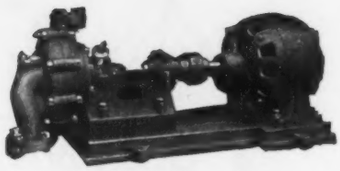


Pelton Type DS Pumps for heavy duty, high efficiency service. Bulletin No. 24

Pelton Type T Deep Well Pumps. Ask for Bulletin No. 22-A.

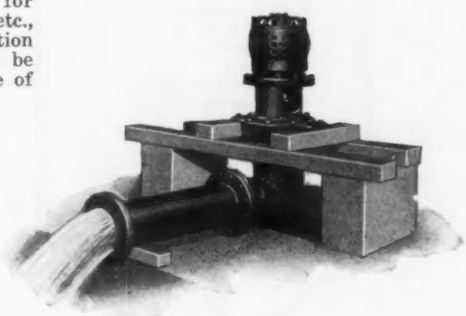
MORE than two score years devoted exclusively to the theory and application of hydraulic laws in the design of turbines and pumping equipment is an invaluable asset embodied in all types of Pelton pumps. This experience, applied both to the utilization of water as power and the elevation of water for industrial and domestic service, has made possible the superior performance characteristics shown wherever Pelton pumps have been installed.

Pelton pumps are adapted to many uses in utility construction and operation, these including unwatering of foundation and other excavations, furnishing pressure water for camp sites, fire protection, water circulation for transformers, cooling ponds, etc., as well as drainage, reclamation and booster service. We will be glad to forward a complete file of these bulletins upon request.



Pelton Type FD Pumps for overhead irrigation and domestic water supply. Bulletin No. 21.

Pelton Type LL Pumps for low head irrigation or reclamation service. Bulletin No. 23.



Pelton Type B Centrifugal Pumps for irrigation and general utility. Bulletin No. 18.

THE PELTON WATER WHEEL COMPANY

Hydraulic Engineers

2985 Nineteenth St., SAN FRANCISCO **100 Broadway, NEW YORK**

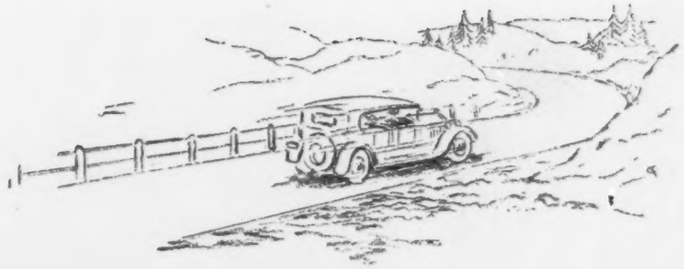
Divisional Office in American Trust Building, Birmingham, Ala.

Associated Companies: I. P. Morris Corporation, Philadelphia, Pa.; Dominion Engineering Works, Montreal.

Pacific Coast Representative for Larner Engineering Co., Philadelphia, Pa.; De La Vergne Machine Co., New York, N. Y.

PELTON

No. 641
Recommended Working Load, 3500 pounds. Rated Combined M. and E. Strength, 10,500 pounds. Reserve Strength Ratio 3:1



Oversize
—*Now Standard Practice*

YOU now seldom hear of "oversize" tires. The automotive industry recognized that oversize—strength in reserve—means longer life; therefore, oversize became standard.

Strength in reserve also adds years to the life of Westinghouse insulators. Strains are always considerably below the breaking point even when the sleet-laden wind sings through the ice-covered wires. And, in addition, there is reserve strength for those unlooked-for emergencies that no one can foresee.

Super-power has tried Westinghouse insulators and pronounced them good. Whatever the service, Westinghouse insulators, by reason of their reserve strength, can be installed and then forgotten.

Westinghouse Electric & Manufacturing Company
Derry (Pa.) Works Emeryville (Cal.) Works
Sales Offices in All Principal Cities of the United States and Foreign Countries

Porcelain
you can install *– and forget*

— because science — not tradition — governs the making of all Westinghouse porcelain and insulators.

— precision processes, at every stage, are the rule.

— never is anything taken for granted at any time.

— even slight variations in materials are compensated for.

First the design — then the raw materials — then the method — and then, a vigilance that permits no compromise.

Insulators with Reserve Strength

Westinghouse

X91093

SAN JOSE, CALIF.

An Advertisement for LIGHT

ADEQUATE street lighting means more to the central station than the increased revenue from the larger lamps—gratifying though that may be. Street lighting advertises the value of LIGHT and stimulates the use of electricity—in stores, in offices, in homes.

For strangers, a system of attractively lighted streets is a better advertisement than a billboard. It demonstrates the progressiveness of the community, attracting the better class of citizens who want and can afford modern conveniences, and bringing in new factories —users of light and power.

A central station grows with the community it serves.

Complete Street Lighting Service

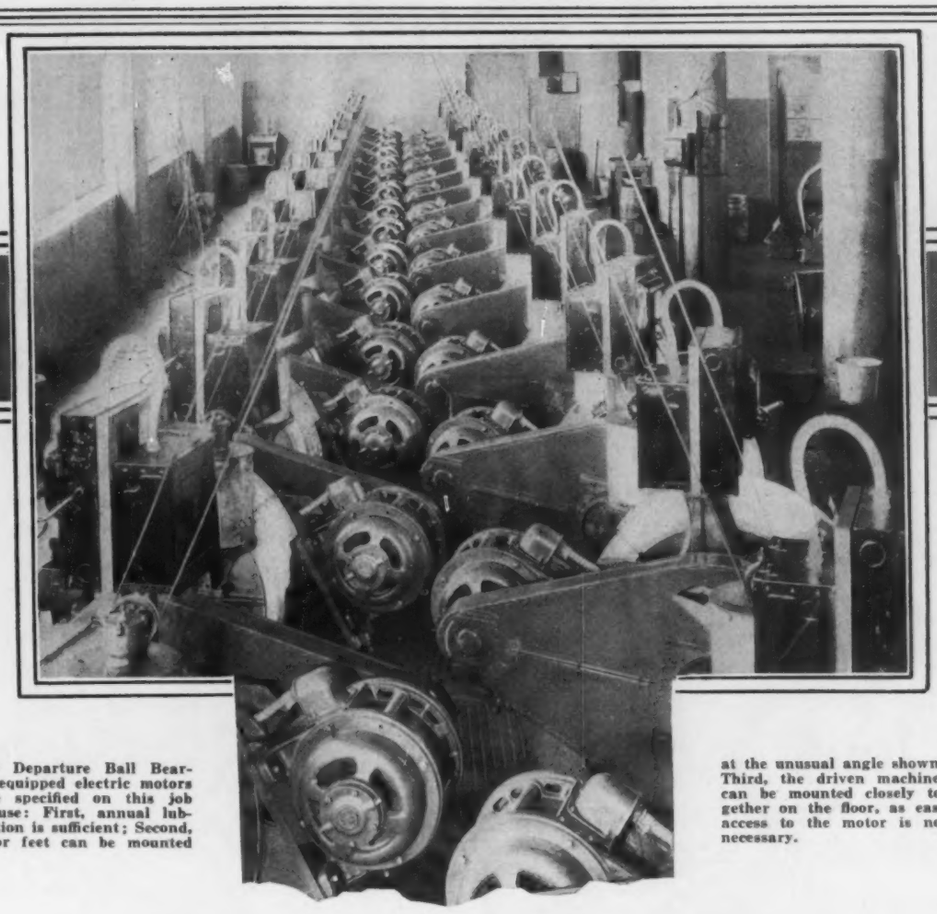
WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
South Bend Works South Bend, Indiana

Sales Offices in All Principal Cities of the United States and Foreign Countries

Butte, 52 East Broadway
Casper, Wyo., 124 W. 2nd St.
Denver, 910 Fifteenth St.
El Paso, Mills Bldg.
Fresno, Hotel Fresno
Los Angeles, 420 So. San Pedro St.
Phoenix, Ariz., 412 Luhrs Bldg.
Portland, 901-2-3 Porter Bldg.
Salt Lake City, South Temple and West Temple Sts.
San Francisco, 1 Montgomery St.
Seattle, Lloyd Bldg., 6th Ave. and Stewart St.
Spokane, 1322-23 Old National Bank Bldg.
Tacoma, 1118 Rust Bldg.

Westinghouse

X91146



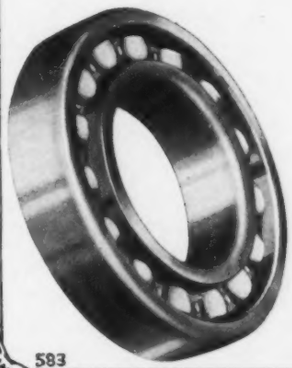
New Departure Ball Bearing equipped electric motors were specified on this job because: First, annual lubrication is sufficient; Second, motor feet can be mounted at the unusual angle shown; Third, the driven machines can be mounted closely together on the floor, as easy access to the motor is not necessary.

New Departure Advantages and Economics Are Money Savers in Electric Motors

Write for copy of "Cutting Your Costs", non-technical treatise on the application of ball bearings to electric motors; also, "Booklet K", technical treatise on the same subject. Either or both sent on request.

Electric motors equipped with New Departure Ball Bearings operate without friction and without wear continuously and uninterruptedly requiring lubrication only once in 9 to 12 months.

Because of these superior advantages production is increased at a substantial reduction of maintenance cost proving that New Departure Ball Bearings are more economical than any other type of anti-friction bearing.



The New Departure Manufacturing Company
Chicago Bristol, Connecticut Detroit

New Departure Quality Ball Bearings

583

The Jonathan Club

Wired in Youngstown-Buckeye Conduit

One of the most beautiful of the newer buildings in Los Angeles, the Jonathan Club Building shown here, was wired throughout in Youngstown-Buckeye Conduit.

Architects: Schultze & Weaver.
General Contractors: Lange & Bergstrom.
Electrical Contractors: J. C. Rendler, Inc.
All of Los Angeles.

In all the better buildings from the Rio Grande to Puget Sound and from Pikes Peak to the Golden Gate, "Youngstown - Buckeye" installations predominate.

You can't go wrong when you specify the best conduit that money can purchase.

The Youngstown Sheet & Tube Co.
Youngstown, Ohio.

PACIFIC COAST DISTRIBUTORS:

Allied Industries, Inc.
1256 Factory Place, Los Angeles, Calif.
532 First Ave. So., Seattle, Wash.
453-455 Second Street, San Francisco, Calif.
53 Fourth Street, Portland, Oregon.
305 Ninth Street, Oakland, Calif.

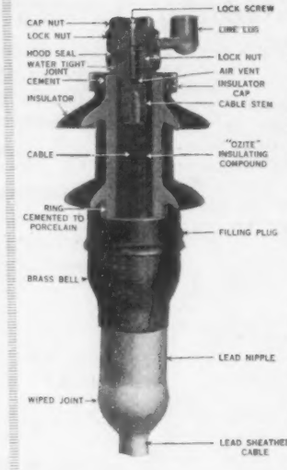
Howell Red Band Electric Motors are your assurance of true motor value

Order them from the Howell Branch Offices in these cities:

Denver, Colo. - - - 1429 18th Street
Los Angeles, Cal. - I. W. Hellman Bldg.
Portland, Ore. - - - 209 Oak Street
San Francisco, Cal. - - - 130 8th Street
Salt Lake City, Utah, 228 W. South Temple
Seattle, Wash. - - - 522 First Avenue
Spokane, Wash. - - - P. O. Box 3
Vancouver, B. C. - 61 Alexander Street

Howell RED BAND ELECTRIC Motors
(96)

A long step forward



in the development of cable protecting devices is represented by the new STANDARD Hollow Stem Type Terminal. This fact will be recognized upon inspection of the sectional view of this terminal as designed for working pressures ranging upwards from 12,000 volts.

STANDARD
Hollow Stem Type D.O.A. Terminals
(Pat. 1,605,470, Nov. 2, 1926)

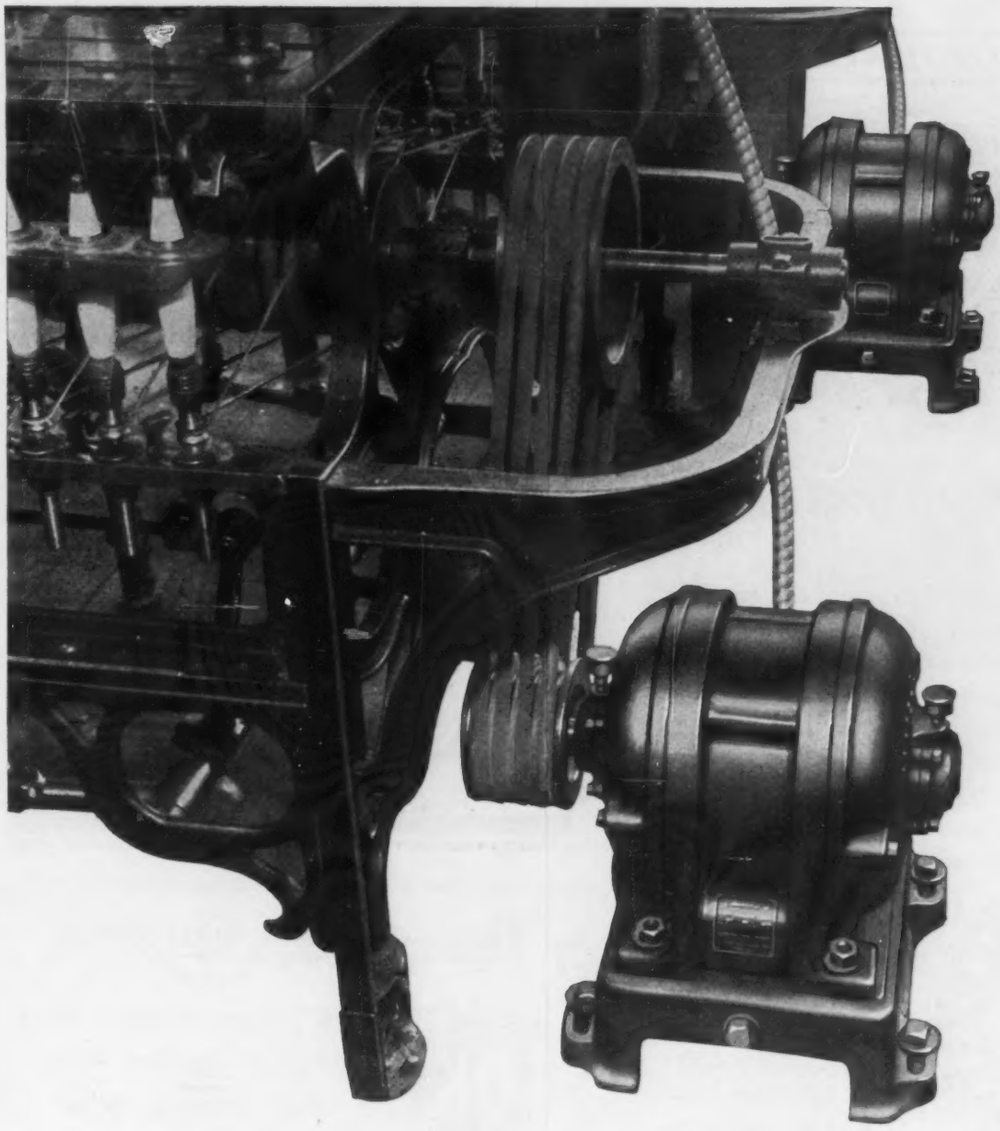
insure complete flushing, elimination of all air pockets and a complete final filling with compound thus insuring complete protection to cable insulation and minimum expense for upkeep.

There are no rubber gaskets to deteriorate or wear out. The assembly joints consist of tapered, accurately-machined surfaces clamped tightly together by lock nuts and protected by hooded cap nuts.

If you are interested in getting the most value from your cable terminals, write our nearest office for further information.

Standard Underground Cable Co.
General Offices: Pittsburgh, Pa.

PACIFIC COAST DEPARTMENT
San Francisco, Los Angeles, Seattle, Salt Lake City.
Factory at Emeryville, Calif.



PROTECTING production and reducing costs for the Laurens Cotton Mills are 261 Allis-Chalmers motors equipped with Timken Bearings.

Freedom from friction, attained with Timken Bearings, notably reduces starting load, saves power, and eliminates all but one or two greasings a year. The compact, perfectly enclosed Timken housings prevent dripping.

More than anti-friction bearings, Timkens completely guard against thrust and all other forms of wear, with their tapered construction, *POSITIVELY ALIGNED ROLLS,* and Timken electric steel. For motor bearings that endure like the frame itself, specify Timkens.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Technical information regarding bearing sizes and mountings is obtainable from the Timken Roller Bearing Service & Sales Company's Branches located in the following cities: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, Newark, New York, Omaha, Philadelphia, Pittsburgh, Richmond, St. Louis, San Francisco, Seattle, Toronto, Winnipeg

TIMKEN *Tapered Roller* **BEARINGS**

PRACTICAL LUBRICATION SERVICE

high *temperatures!*

FOREMOST among the enemies of efficient industrial lubrication—high temperatures! Wherever wheels and bearings turn there are points of terrific heat that challenge the quality of oils and greases.

Associated Practical Lubrication Service has perfected an Avon lubricant to meet every adverse condition. Specially prepared products applied at points of heat protect you from costly breakdowns. What is more, this service provides trained experts to show how these products should be used.

Call our nearest office today for a service that will save you time and money. Our staff of industrial lubrication engineers is at your disposal in solving lubricating problems.

AVON ASSOCIATED INDUSTRIAL OIL COMPANY LUBRICANTS

Sustained Quality
Industrial Lubricants
Avon Mineral Cylinder Oils
Avon Mardex Engine Oils
Avon Cup Greases
Avon Maclac Compounds
Yuma Greases
Roll Neck Greases
Lassen Fibre Greases
Firex Greases
Cycol Motor Oils and Greases

Associated Oil Company

District Agencies

San Francisco Los Angeles Sacramento
Santa Rosa Honolulu Fresno Portland
San Jose Stockton Oakland Seattle

Additional distribution plants at convenient points in California, Oregon, Washington and Hawaii

1—7s

Tycos Temperature Instruments

can be advantageously adapted to every temperature problem. *Tycos* service is uniform, efficient, dependable. Authentic information on your particular needs furnished without obligation.

Taylor Instrument Companies
ROCHESTER, N.Y., U.S.A.

CANADIAN PLANT
TYCOS BUILDING
TORONTO

MANUFACTURING DISTRIBUTORS
IN GREAT BRITAIN
SHORT & MASON, LTD., LONDON

BARE AND INSULATED WIRES

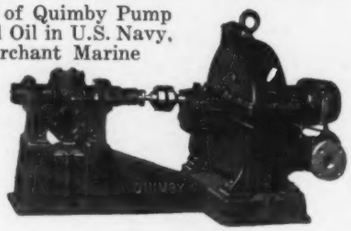
WEATHER-PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

"OK" Weatherproof Wire
"Parac" Rubber Wire
Slow Burning Wire
Bare Copper Wire

PHILLIPS WIRE COMPANY
Pawtucket, R. I.

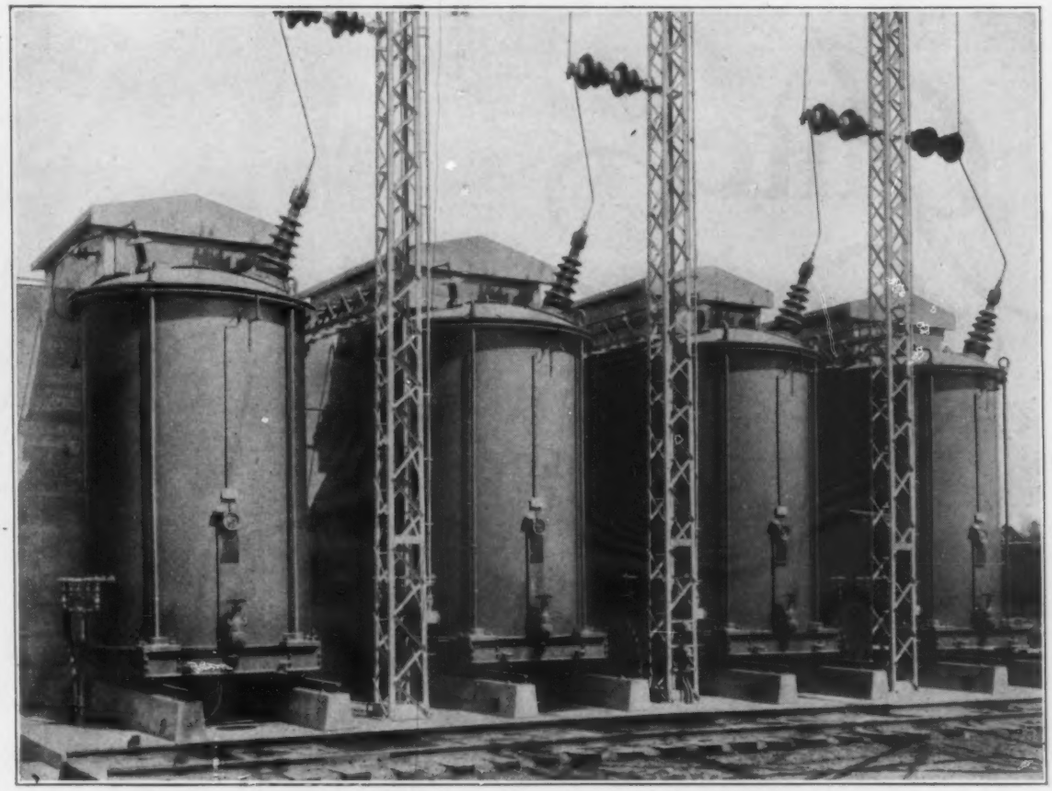
QUIMBY SCREW PUMPS

Get from us Report of Quimby Pump Performance on Fuel Oil in U.S. Navy. Used also in Merchant Marine



Fuel Oil
Water
Cold and Hot Oil
Brine
Molasses
Soap
Sludge
Any Service

QUIMBY PUMP CO., INC.
342 Thomas Street Newark, N. J.
OLIVER B. LYMAN
Call Building, San Francisco, Calif.



Four 10,000 KV-A., 108,000 Volt H.V., 12,450 Volts L.V.
Tertiary voltage, 5000 KV-A., 6600 Volts, O.I.W.C.O.
Transformers.

Power Transformers

The above installation shows the four 10,000 KV-A. Allis-Chalmers, oil-insulated, water-cooled, outdoor type Transformer installed in the San Jose Substation of the Pacific Gas and Electric Company. This is a recent installation and one that is proving highly successful.

Allis-Chalmers power transformers are giving continuous uninterrupted service in many of the large generating and substations of the country.

PACIFIC COAST OFFICES:

Rialto Building, San Francisco, Calif.
622 Title Insurance Building, Los Angeles, Calif.
115 Jackson Street, Seattle, Wash.
505 Lumbermen's Building, Portland, Ore
525 Symes Building, Denver, Colo.
915 Kearns Building, Salt Lake City, Utah.

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

District Offices in All Principal Cities

Inter Connection

Its effect on

(Case 8)

Secondary Power

RIVERS are variable in flow. It is not always practicable to provide for water storage. Also, water storage is often extremely expensive.

Without water storage operation must be based on run-of-the-river conditions, which may reduce the assured average to as low as 40 per cent of generator capacity.

With such an installation, reserve capacity in some form usually must be available. Steam standby is likely to be very costly, especially during years of good water flow.

Let us see how interconnection may function here.

The Principal Interconnected Electric Systems of the U. S

A Practical Instance

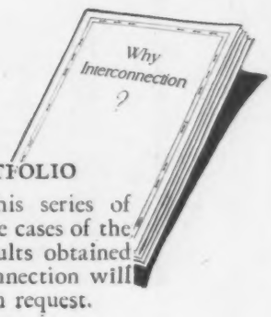
From "*Getting Down to Cases in Electric Interconnection*"
—*by* BONBRIGHT & CO., INC.

A net saving of approximately $100,000 per annum

A SYSTEM primarily hydro-electric found it necessary to generate about 20,000,000 kilowatt-hours each year in a 5,000-kilowatt steam reserve station in order to supply peak demands for electrical energy.

In the same district was another hydro-electric system with facilities for water storage that gave it excess capacity. The two systems were interconnected and the reserve steam station absolutely shut down.

After deducting the carrying charges on the investment in the interconnecting transmission line, the first company made a net saving of approximately $100,000 per year.



A PORTFOLIO
presenting this series of fifteen definite cases of the economic results obtained from interconnection will be sent on request.

"No interconnection can be a success unless the attitude of the respective companies and their operating forces is based upon a mutual consideration of the interests of both companies in the service of the public."
POWER SURVEY COMMITTEE
Dec. 1, 1925 Great Lakes Division, N. E. L. A.

OHIO BRASS COMPANY • MANSFIELD, OHIO

Believing interconnection stands out among the factors that have enabled Electric Light and Power Companies to keep down the price of electricity in the face of higher costs of the elements entering into its production, the Ohio Brass Company presents this serial portrayal of how interconnection is assisting in

Giving the Public Better Electric Service

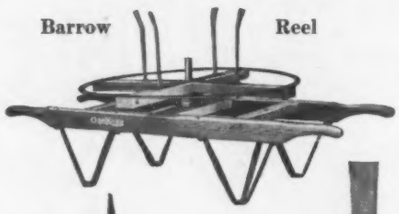
Most Practical for the Job

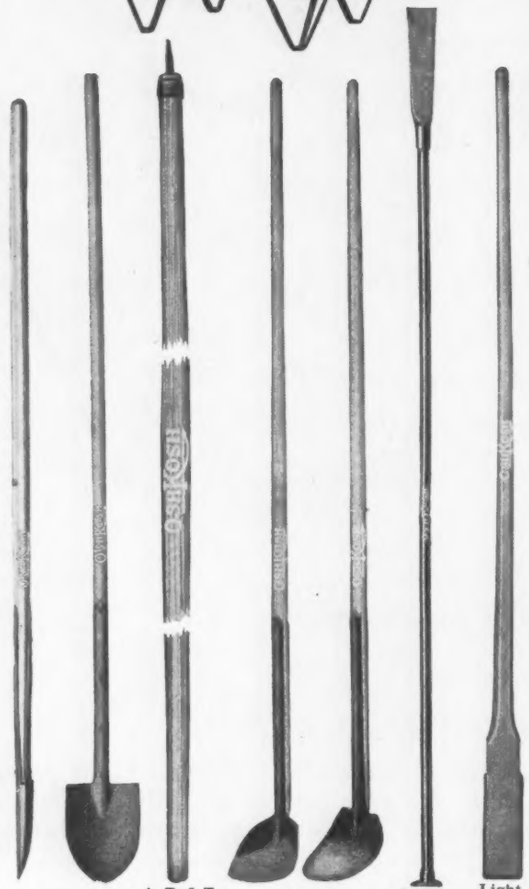
OSHKOSH
POLE LINE CONSTRUCTION TOOLS

There is an Oshkosh Tool of the proper quality for every pole line requirement. Greatest strength at point of strain is an Oshkosh feature in every tool. Larger stocks make prompt shipments possible. Ask for our catalog.

LEACH COMPANY
Oshkosh, Wisconsin

Complete Stocks Carried by
Graybar Electric Company Los Angeles, San Francisco, Portland Seattle, Spokane
Pacific States Electric Company





"INDIANA"
Double Galvanized Telephone and Telegraph Wire

Crapo Patents
Non-Peeling
Non-Cracking

At last the Telephone and Electrical Industry is assured longer life and lower maintenance on galvanized wire construction through our new and improved patented Galvanizing Process, which insures a wire with Non-Peeling and Non-Cracking Zinc Coating. Now in full commercial production. Carried in stock by Representative Supply Jobbers.

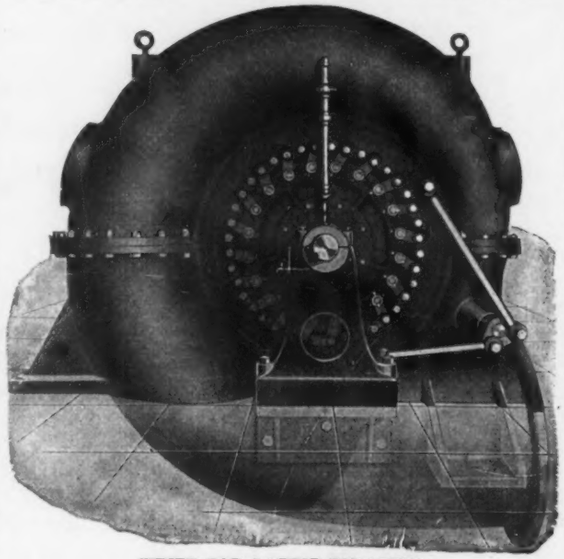
Illustration at right shows what happens to old process galvanizing, while illustration at left shows assured results of Crapo process—(patented)

Galvanized Steel Strand

Standard or Commercial, Siemens-Martin, High Strength and Extra High Strength Grades

Indiana Steel & Wire Co., Muncie, Ind.

LEFFEL
TURBINE WATER WHEELS



WRITE FOR LATEST BULLETINS

The JAMES LEFFEL & CO.
SPRINGFIELD, OHIO

They are Still Standing up in KANSAS

The recent cyclone which swept through Kansas and the Middle West was most severe—taking a large toll of life and property. The pictures reproduced above show how "Black Beauty" Poles in the lines of the United Power & Light Corporation, near Hutchinson, Kansas, resisted the storm.

Wires were blown off, and note the dangling transformer which was literally blown from the pole—*but the poles themselves stood up and did not break*—although the tremendous wind pressure forced some of them away from the perpendicular, due to the comparatively recent installation and lack of compactness of the surrounding soil.

"Black Beauty" Poles reduce service interruptions and losses from storms to the minimum. They stand up, when untreated poles go down.

TEXAS CREOSOTING COMPANY
Main Office and Plant: Orange, Texas, U.S.A.

W. W. WILKINSON, Pacific Coast Representative,
1213 Insurance Exchange Bldg., Los Angeles, Calif.

2T7

Service with a Capital "S"

Service is a much abused word, but the "Black Beauty" organization really makes good when put to the test. Here is an example:

At 6:10 p.m., May 9th, we received a telegram from the Union Electric Company, of Abilene, Kansas, ordering immediate shipment of 3 cars of "Black Beauty" Poles to the United Power & Light Corporation, at Hutchinson, Kan., to replace storm losses of untreated poles. The 3 cars were loaded that same night with select poles from our large stock which we carry treated to standard specifications. At 8:25 a.m., the following morning, we wired them the car numbers and routing and the cars left our plant at 9 a.m.—less than 15 hours after the order was received.

"BLACK BEAUTY" POLES

Why let good engineering stop at the POLE TOP?

Your substations, the pole lines—all carefully designed with full advantage taken of modern equipment to give you greatest operating efficiency at least cost.

Oft times good engineering fails to include the pole top. Full advantage is not taken of the space at the pole top. Here is great opportunity not only for economy in arrangement but also for economy and speed in service restoration. All this is possible by simply taking advantage of the convenience and time saving features of G & W Disconnecting Potheads.

They are made in shapes and sizes so that it is possible with proper engineering to get the maximum in simplicity, protection, flexibility and economy.

G & W Electric Specialty Co.
7780 Dante Ave., Chicago, Ill.

G&W ELECTRIC SPECIALTIES

Exactly What You Want!
G & W design and manufacture practically every device for the end of a cable. See Catalog No. 26.

Potheads	Underground Boxes
Series Cutouts	Conduit Bells
Primary Cutouts	Ground Caps
Oil Fuse Cutouts	Ground Pipe Points
Oil and air break disconnecting devices with and without automatic control.	

More than Protection **G&W** for the Cable Ends

POTHEADS AND BOXES

Dangerous Work
Made SAFE and EASY
The
Two-Gear Tree Trimmer
with
Bush Treated Handle
High gear for small limbs, low gear for large limbs that ordinarily require a saw
AN INVESTMENT you cannot afford to overlook, for when you buy this tool you acquire AN INSURANCE POLICY AGAINST ELECTRIC SHOCK in tree trimming, because there are no wires, no ropes, and no metallic connection between operating handle and cutting blade, and
The Main Handle will Stand 100,000 Volts
YOU also buy INCREASED EFFICIENCY Operating in LOW GEAR this trimmer eliminates 50% of the slow sawing jobs.
Within the last few years wages in many cases have doubled.
Give your men high class tools that double their output and BREAK EVEN ON THE DEAL!
Write for Bulletin A giving details of the High and Low Gear Principle
THE BUSH ELECTRIC COMPANY
6616 MORGAN AVE.,
CLEVELAND, O.

Western Representative:
Western Sales & Engineering Co., 1647 Atlantic St., Oakland, Calif.

HEMINGRAY

made in sizes up to 15,000 *volts*

EST. 1848

INC. 1870

For medium voltage lines
Insulate with Glass

Advantages!

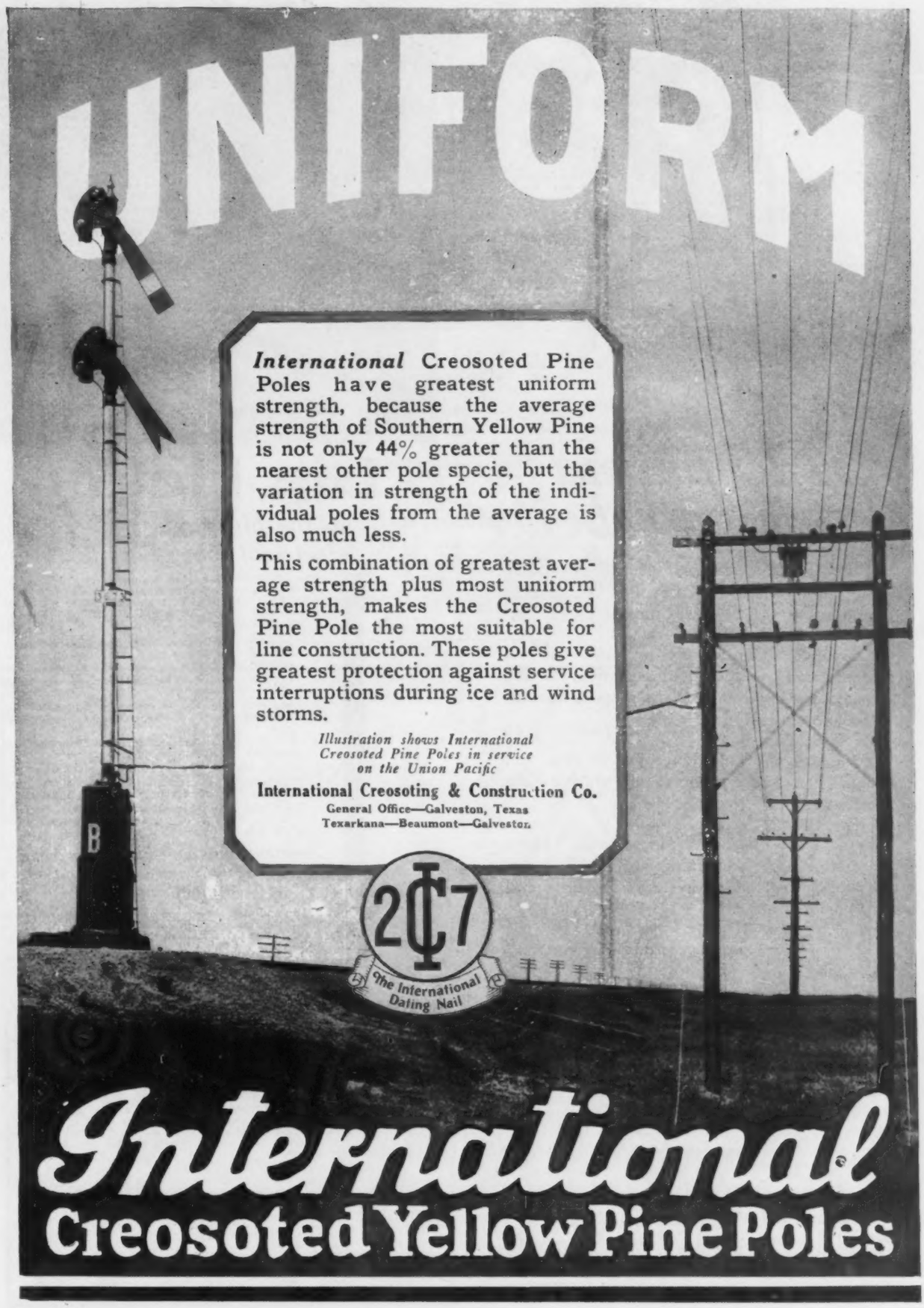
(1) **Transparency**
Exposes internal defects

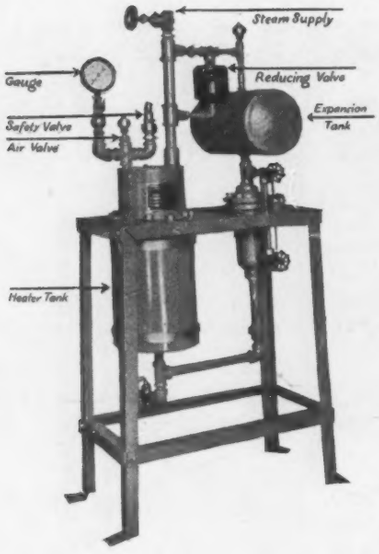
(2) **Non-Porosity**
Eliminates Moisture Absorption
Sustains dielectric strength
Prevents deterioration

(3) **Homogenity**
Insures uniform insulating properties throughout each insulator.

Up to 15,000 standardize on Glass

HEMINGRAY GLASS CO.
General Office and Factory Muncie, Ind.


UNIFORM
International Creosoted Pine Poles have greatest uniform strength, because the average strength of Southern Yellow Pine is not only 44% greater than the nearest other pole specie, but the variation in strength of the individual poles from the average is also much less.
This combination of greatest average strength plus most uniform strength, makes the Creosoted Pine Pole the most suitable for line construction. These poles give greatest protection against service interruptions during ice and wind storms.
Illustration shows International Creosoted Pine Poles in service on the Union Pacific
International Creosoting & Construction Co.
General Office—Galveston, Texas
Texarkana—Beaumont—Galveston
2IC7
The International Dating Nail
International
Creosoted Yellow Pine Poles



A 75 pound electric steam boiler

THE ¼ H. P. Chicago electric steam generator weighs but 75 pounds. It occupies small space and is easily moved.

It supplies steam of the pressure desired, automatically and without attention. When no steam is being drawn, the electric current used is practically negligible.

The Chicago steam generator is safe and clean. Low water automatically shuts off the current.

The field for this boiler is unlimited. Here are a few uses: sterilizing equipment, metal parts cleaning, oil caldrons, coffee urns and dry cleaning.

Let us quote you prices and discounts.

Chicago Automatic Electric Boiler Co.
1966 Southport Avenue
Chicago, Illinois

CHICAGO AUTOMATIC ELECTRIC BOILER CO.
1966 Southport Ave., Chicago

Gentlemen:

Send me prices, discounts and data sheets for computing costs on electric steam generators.

Name .....

Firm .....

Street and No. .....

City .....

E.W.7-Gray

5 Big Helps

to the big-pay electrical job

New Form

The Library of Electrical Maintenance and Repair—in its new form—contains Annett & Roe's CONNECTING AND TESTING D.C. MACHINES and the new second edition of Dudley's CONNECTING INDUCTION MOTORS.

1. The five books in this library discuss actual repair jobs and show you step by step what to do when anything goes wrong.
2. They show you how to locate and remedy motor and generator troubles.
3. They show you how to reconnect motors to meet any condition of voltage, phase, frequency and speed.
4. They give you suggestions for preventing electrical machinery troubles.
5. They cover fully the rewinding of motors.
6. They present information that will help you get better service out of your electrical equipment.
7. They give you tables, data, kinks and diagrams that you will find of priceless value every day on every job.

See It Free

Free examination—no money down—only $2.00 in ten days and $2.00 a month until paid

Fill in and mail the coupon attached and we will send you the entire set of five volumes for ten days' Free Examination. We take all the risk—pay all charges.

You assume no obligations—you pay nothing unless you decide to keep the books. Then $2.00 in ten days and the balance at the rate of $2.00 a month. Send the coupon NOW and see the books for yourself.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

Gentlemen:—Send me the LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR all charges prepaid for 10 days' Free Examination. If satisfactory I will send $2.00 in ten days and $2.00 a month until $14.00 has been paid. If not wanted I will write for shipping instructions.

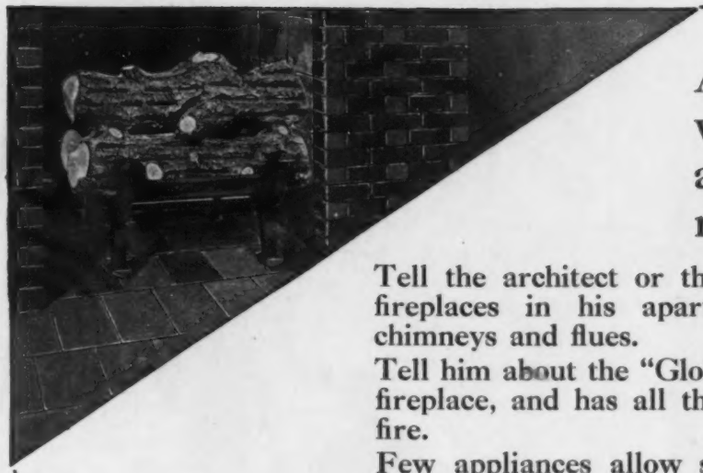
Name .....

Home Address .....

City and State .....

Firm or Employer .....

Occupation O7-1-27



An Apartment House with fireplaces can always get higher rents

Tell the architect or the builder how he can put fireplaces in his apartments without expensive chimneys and flues.

Tell him about the "Glolog" that needs only a false fireplace, and has all the realism of a blazing log fire.

Few appliances allow such a profit, or offer the control station a better load. In addition, there is a good wiring profit.

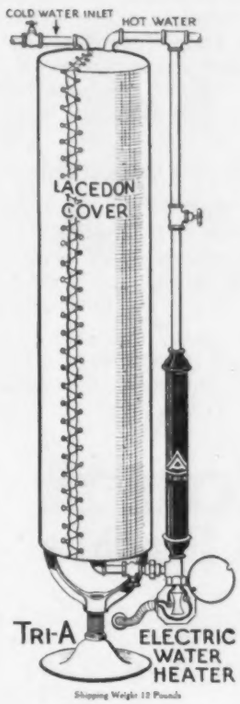
Here are your prospects!

Apartments and Private Homes, Hotels, Clubs, Directors' Rooms, Libraries, Theatres, Offices, Lodges and even Steamships!

For prices and specifications address

Atlantic-Pacific Agencies Corp.
383 Brannan St., San Francisco
Deliveries from San Francisco stock
Strait & Richards, Inc., *Mfrs.*, Newark, N. J.

GLOLOG



Where Circulation Type Water Heaters Are Preferred

TRI-A

The Tri-A circulation type water heater offers the electrical dealer and central station the utmost in sales possibilities where this type is preferred.

The Tri-A is the result of 30 years experience in the development—*that will sell because it serves.*

There is profit with no fear of service when you sell any piece of Apfel electric heating equipment.

LIST PRICES

2,500 watts—250 volts	$20.00
1,500 watts—120 volts	17.50
Either size with Automatic Thermostatic Switch complete	45.00

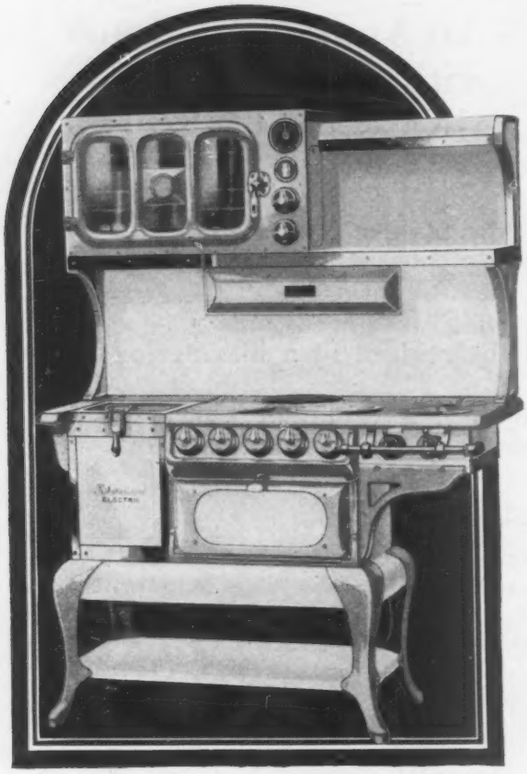
Trade discounts are exceptionally liberal.

THE APFEL LINE IS
A LOAD AND PROFIT BUILDER

ELECTRIC HEATING & MFG. CO.

Sixth North at Harrison Street, Seattle, Wash.

Northern California	Southern California	Washington
O. W. Forsyth	R. Wolfsberg, Inc.	Lynn A. Lougheed
1175 Howard St.	1851 Industrial St.	620 Tacoma Bldg.
San Francisco	Los Angeles	Tacoma



A Standard leader—a complete domestic range of cabinet type, with three electric hotplates, two gas hotplates and Standard fireless cooker compartment, roomy oven and broiler. Cooker and oven both aluminum lined. Model No. 639-G.

A Quality Line that you can tie to

You feel the same way about customers that we feel about dealers. You like permanent customers—and we like permanent dealer connections. So we build a quality line of electric ranges—the kind you can tie to, and sell with confidence. A complete line, too, to cover all electric cooking requirements—big, heavy-duty ranges for hotel and club kitchens and large residences; wall ranges for apartments and small homes; ranges with fireless cookers; electric toasters, broilers, griddles and hotplates. The Standard franchise is profitable. Let us show you how, and why. Write for catalog and full information.

Standard
ELECTRIC RANGES

The STANDARD ELECTRIC STOVE Co.
TOLEDO · OHIO · U·S·A

"I wouldn't part with this record for a lot of money"

"IT'S the quickest, surest and safest way I know of ordering carbon brushes. The brush requirements for every motor and generator in the plant are listed here. The National Carbon Company who prepared this Master Brush Data for me have a duplicate copy.

"When I need brushes for any machine I just wire, write or phone to send brushes for Item so-and-so. No other specifications are necessary. The brushes arrive promptly, they fit, and they work right.

"I always keep a reserve stock of brushes on hand for all the important machines in the plant and use the item numbers on this Data Sheet for my stock records. This Data Sheet System works like a charm. Expensive tie-ups are a thing of the past with me. My machines are working at higher efficiency than ever before.

"No, sir, I wouldn't part with this record for a lot of money."

A National Carbon Company sales engineer is ready to make a complete and thorough inspection of your machines and we will supply you with a Master Brush Data Sheet listing all your brush requirements.

Thousands of industrial plants and public utilities are taking advantage of our Data Sheet Service. It saves them time, money, trouble. Let us explain the advantages this service holds for you.

National
Pyramid Brushes

NATIONAL CARBON COMPANY, INC.
Cleveland San Francisco
Unit of Union Carbide and Carbon Corporation

Emergency Service Plant
SAN FRANCISCO, CAL., 599 8th St. Phone: Park 8800

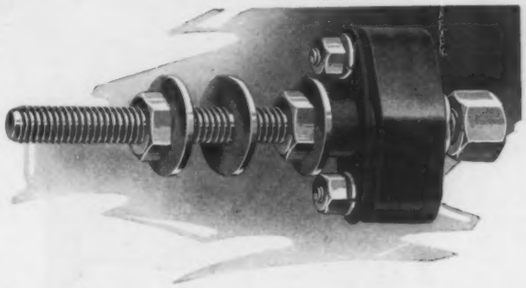
Pattern No. 30

Pattern No. 30—The above illustration shows the plain, case front of dull black devoid of distracting lettering. The extra large and wide scale opening makes the black lettering on the white background clearly visible and distant reading easy. This is one example of the careful design carried out on every part. Jewell instruments incorporate advanced features not found in other instruments.

JEWELL

Insulation and Mechanical Strength Combine

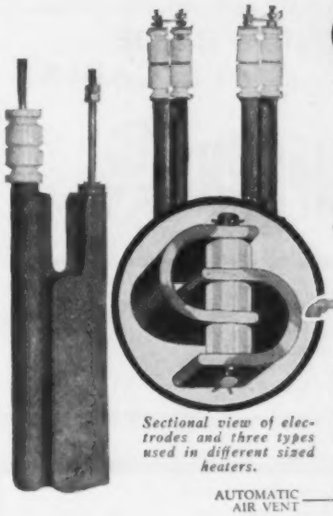
Insulation and mechanical strength combine in the mounting studs on Jewell instruments. At the point where the stud passes through the instrument case all possibility of grounding has been overcome by the moulded design which provides insulation many times in excess of possible requirements. Insulation tests of 4,000 volts to ground conducted on the stud and instrument assembly as a whole have never produced breakdown.



In addition, the moulded asbestos binder bakelite used for the stud head provides utmost strength and makes fracture remote when pressure is applied in tightening the instrument to a switchboard.

Write for descriptive Circular No. 1100

Jewell Electrical Instrument Company
1650 *Walnut St.* :: :: *Chicago, Ill.*
"27 Years Making Good Instruments"



Sectional view of electrodes and three types used in different sized heaters.

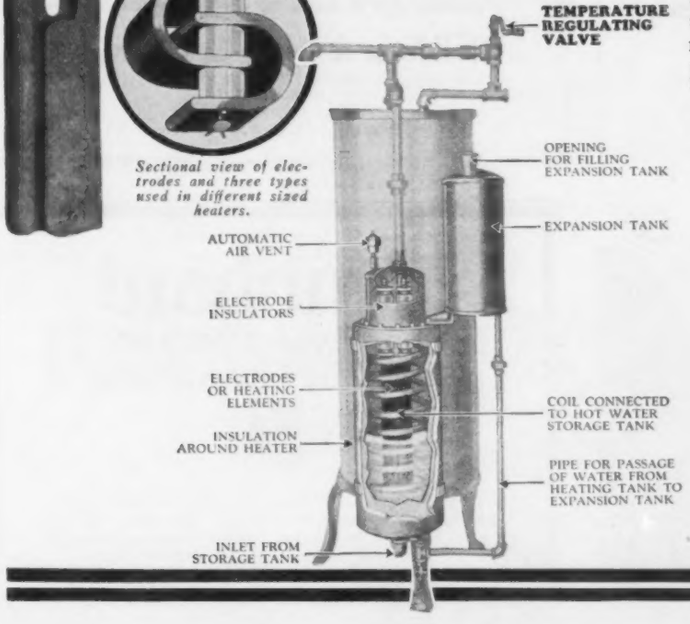
99% Efficient

WATER is the resistance between the electrodes in the Chicago automatic electric water heater. The hottest point is at the center of the heater—not outside it. All the electric energy is converted into heat—the only loss being that due to radiation. Thorough insulation makes this very low.

The Chicago heater is 100% automatic—current is drawn in exact proportion to the heat required. This automatic feature is constant and accurate—the tank cannot overheat.

Here is an automatic heater with no thermostat or moving parts—a heater which does not require servicing.

Furthermore, it is absolutely safe and is approved by the National Board of Fire Underwriters, Chicago.


TEMPERATURE REGULATING VALVE
OPENING FOR FILLING EXPANSION TANK
EXPANSION TANK
AUTOMATIC AIR VENT
ELECTRODE INSULATORS
ELECTRODES OR HEATING ELEMENTS
INSULATION AROUND HEATER
COIL CONNECTED TO HOT WATER STORAGE TANK
PIPE FOR PASSAGE OF WATER FROM HEATING TANK TO EXPANSION TANK
INLET FROM STORAGE TANK

Write for prices and discounts.

Chicago Automatic Electric Boiler Co.
1966 Southport Ave., Chicago

Chicago
AUTOMATIC ELECTRIC WATER HEATER

Chicago Automatic Electric Boiler Co.
1966 Southport Ave., Chicago, Ill.
Gentlemen:
Please send me prices, discounts and data sheets for computing prices on electric heaters.
Name .....
Position .....
Street address .....
City and State .....

E.W.7-Gray

L&H ELECTRICS
TRADE MARK

A Big Field for Profit!

The Combination Range shown here, with built-in Kitchen Heater and full Automatic Time and Temperature Controls, is representative of the dominance of L&H Electrics.

An extremely compact model, with extra large oven, complete in every detail. Has four-unit cooking top and return flue kitchen heater built in, providing a quick means for disposing of kitchen refuse, and the additional convenience of extra heat for the kitchen when needed.

L&H Electrics Ranges—with ***full Automatic Time and Temperature Controls,*** rust-proof porcelain enamel finish, and one-piece ovens with rounded corners—are admittedly superior.

What you want is—quicker turnover and bigger profits, plus the assurance that these profits will not be destroyed by expensive servicing.

And that is why we urge you to investigate L&H Electrics products. See your jobber—or write us direct.

A. J. LINDEMANN & HOVERSON CO.
1248 Cleveland Ave., Milwaukee, Wis.

Branches at
Long Beach Building, 405 Lexington Avenue, New York, N. Y.
L&H Building, 2626 W. Washington Blvd., Chicago, Ill.
1636 14th Street, Denver, Colo.
715 Bryant Street, San Francisco, Cal.

In addition to the articles shown here, our line of Electric Appliances also includes:

Hot Plates — Heaters — Irons
Table Stoves — Urn Heaters — Air Heaters
"Turnsit" Toasters — Heating Pads
Curling Irons

C. C. MOORE & CO.
ENGINEERS

Contractors for

Complete Plants

HIGH GRADE MACHINERY

Babcock & Wilcox stationary and marine water tube boilers
Wheeler Condenser & Engineering Co. condensing machinery
Corliss high speed and poppet valve engines
Cochrane feed water metering heaters
Lagonda automatic boiler stop valves
Moore automatic fuel oil regulators
Babcock & Wilcox superheaters
Cochrane feed water softeners
Copes feed water regulators
Cochrane feed water heaters
Cochrane steam separators

Green fuel economizers — Diamond soot blowers
Lagonda tube cleaners — Leslie reducing valves
Hamilton compressors — Reliance water columns

And All Power Plant Auxiliaries

Address our nearest office for catalogs and complete information

Home Office: SAN FRANCISCO, Sheldon Bldg.

Los Angeles, Central Bldg.
Seattle, L. C. Smith Bldg.
Salt Lake City, Kearns Bldg.
Phoenix, Heard Bldg.
Portland, Gasco Bldg.
Vancouver, B. C., Standard Bank Bldg.
New York City, Hudson Terminal Bldg.
Honolulu, T. H.

WEATHERPROOF
WIRES CABLES

CALIFORNIA WIRE

It pays to get acquainted with "California Wire"

California Wire & Cable Co.

EXECUTIVE OFFICE
Orange, Calif.
PLANTS AT
Orange CALIF. Oakland

Hubbard and COMPANY

PITTSBURGH • OAKLAND, CAL. • CHICAGO

HUBBARD

All Hubbard Hardware and Peirce Construction Specialties are carried in stock and sold exclusively on the Pacific Coast by the Graybar Electric Company, Inc., and Pacific States Electric Company.

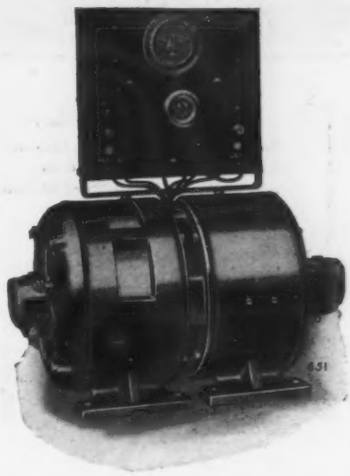
Or What Have You?

What you need in motor generator sets we have. Sets of 80 watts to 15 K. W. output with or without switchboard. Outfits made up of standard machines, union or ring base construction, generators wound shunt or compound for 8, 15, 30, 36, 125, 250 volts and driving motors for standard frequencies and voltages. Sets with special characteristics can be supplied on order.

Complete line we call it.

Whatever your needs you'll find what you want in the R & M line. It scarcely seems necessary to mention that the same skill in design and care in construction is incorporated in our generator sets as in our world famous motors.

80 Watt A.C.-D.C. Outfit without Switchboard



300 Watt A.C.-D.C. Set with Switchboard

The Robbins & Myers Company

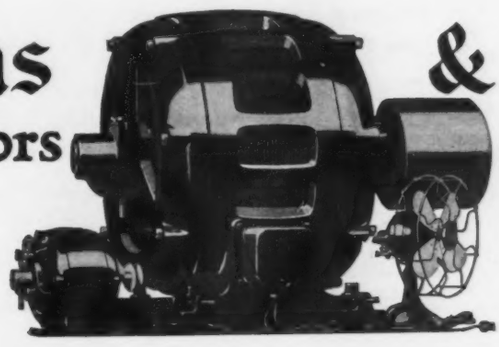
Springfield, O. **Brantford, Ont.**

Chicago, 1825-29 Transportation Bldg.
Cleveland, 1239 W. Third St.
New York, 30 Church St.
Charlotte, 217 Latonia Bldg.
St. Louis, 1922-26 Chestnut St.
Boston, 250 Congress St.
Cincinnati, 9 E. Third St.
Buffalo, 831 Ellicott Sq. Bldg.
Philadelphia, 1418 Walnut St.
San Francisco, 317 Rialto Bldg.

WEST COAST MOTOR DISTRIBUTORS

Stewart Electric Co., 2400 First Ave., South, Seattle, Wash.
B. E. Davis Electric Co., 48 First St., Portland, Ore.
Walter G. Preddey, 187 Golden Gate Ave. San Francisco, Calif.
Hampton Electric & Manufacturing Co., 525 Howard St., San Francisco, Calif.
Kinney & Brown, 4000 E. 14th St., Oakland, Calif.
International Electric & Machinery Co., 523-25 S. Los Angeles St., Los Angeles, Calif.

Robbins & Myers
Motors *and Fans*



Available in Four Sizes

Pole Mounted—2300 Volts Maximum

36 in. by 28 in. by 36 in.

Floor Mounted—15,000 Volts Maximum

42 in. by 54 in. by 90 in.
54 in. by 54 in. by 90 in.
54 in. by 60 in. by 102 in.

Standard Switch Houses

Standard Switch Houses are completely equipped outdoor switching units and include an oil circuit breaker, protective devices, and metering instruments, rigidly supported in a weather- and dust-proof housing.

FEATURES:

Constructed of seamless sheet steel plates, with sides electrically welded to the roof and floor.

Double-section, hinged doors permit padlocking. When these doors are opened, the interior of the house is exposed to practically full height and width. The doors are clamped against a rolled felt packing.

Ventilators assure ample air circulation and prevent condensation.

Bushing flanges are sealed with a gasket. Two coats of rust-resisting paint protect all metal surfaces.

These outdoor switch houses can be moved from place to place as the power demand changes.

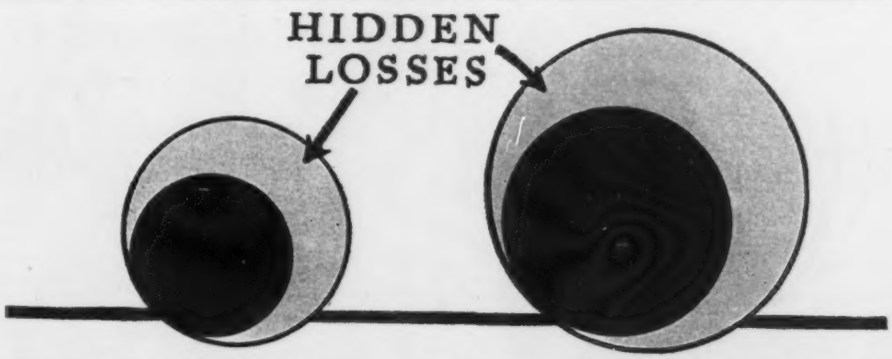
Outdoor Station Equipment

—part of the complete line of General Electric equipment to control and protect power generating and distributing apparatus.

500-2

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



FOR EVERY $100 SPENT FOR PRODUCTION COSTS

$2.00—$4.00 goes for MISCELLANEOUS SUPPLIES

$4.00—$8.00 goes for MAINTENANCE AND REPAIRS

High-quality lubricants reduce these HIDDEN LOSSES

The quality of your lubricants, and their effectiveness in meeting the requirements of each piece of equipment and the conditions under which each is operated, has considerable influence on your total production cost.

It has been determined that for every $100 of production cost $2.00 - $4.00 goes for miscellaneous supplies and $4.00 - $8.00 goes for maintenance and repairs. It is lubrication, largely, that determines whether you pay the maximum or the minimum for these two factors.

Friction causes additional miscellaneous supplies, maintenance and repairs. These additional costs are termed "'hidden losses' in plant operation directly affected by lubrication."

Calol Brand Oils, scientifically applied by a member of our Board of Lubrication Engineers, will keep your equipment correctly lubricated under all conditions. Thus, by reducing the "hidden losses" due to friction your production costs are reduced and your output increased.

A member of our staff of Lubrication Engineers will gladly demonstrate how Calol Brand Oils can reduce production costs in your plant.

STANDARD OIL COMPANY OF CALIFORNIA

HIDDEN LOSSES
in plant operation
[misc. supplies, maintenance and repairs]
directly affected by lubrication

Friction load losses
—unnecessary additional consumption of fuel or current, due to friction.

Shutdowns
—decreased output, due to failure of machinery or parts.

Replaced parts
—cost of new parts and labor installation, due to friction.

Increased babbiting
—cost of material and cost of labor for installation.

Increased maintenance
—extra labor necessary to maintain machinery.

Increased belting
—renewals and repairs caused by additional load, resulting from increased friction.

Wear
—misalignment of shafting bearings; increased friction and wear.

Decreased production
—caused by shutdowns, breakage, reduced operating speeds.

Labor losses
—overtime work for repairs.

CALOL LUBRICATING OILS

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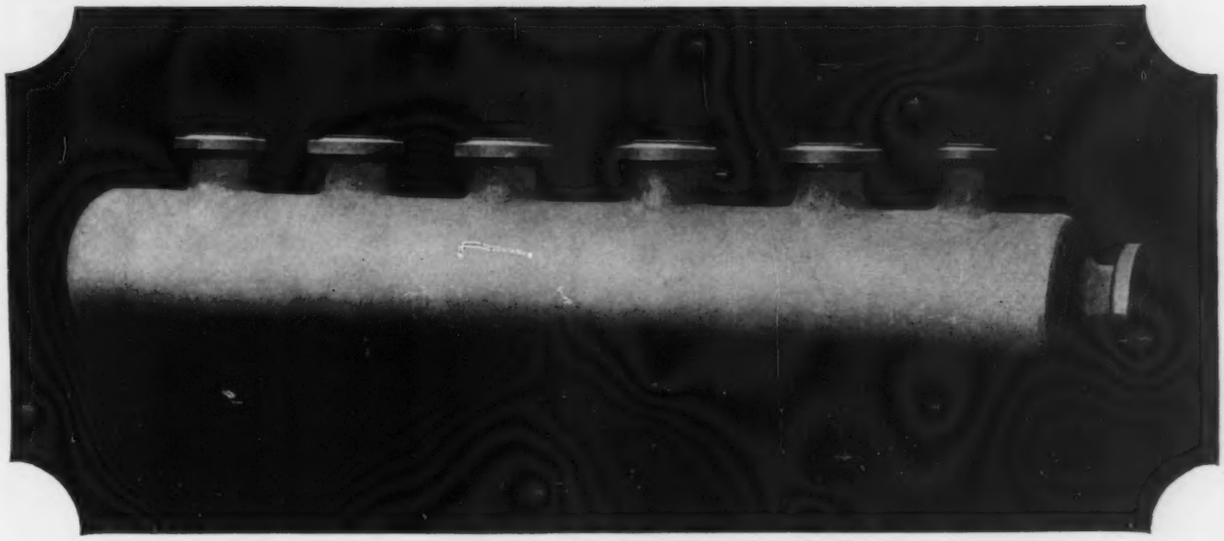

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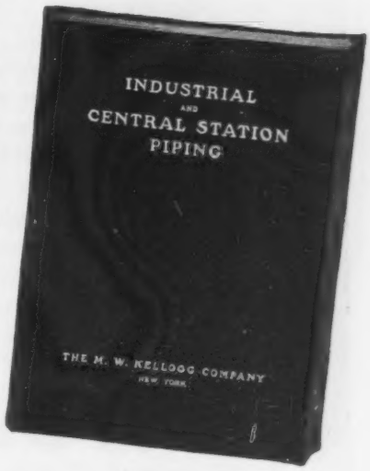

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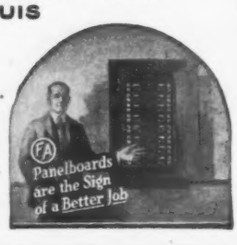

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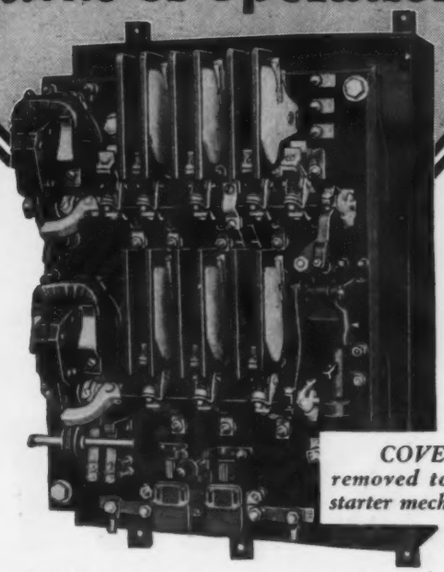

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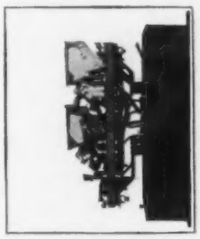

6 *Case designed to provide easy access to all parts of starter. Entire design such that installation or adjustment of any sort requires least possible time and effort.*

7 *Arc shields are easily removed for quick repair or replacement. The free working room thus provided makes repair of contacts simple and easy.*

8 *Chimney type arc shields and heavy blow-out coils quickly carry arc away from contacts, greatly increasing their life.*

9 *Simple, consistent and accurate timing device for unfailing dependability. Note ease of adjustment of time interval.*

10 *Hardened and ground steel bearings used for switch mechanism. Adjustable to compensate for wear through years of steady service.*

11 *Balanced panel design arranged with hole for crane hook makes handling for installation simple and easy.*

12 *Weight of starter supported by mounting strips back of case—not by case. Installation rigid and permanent.*

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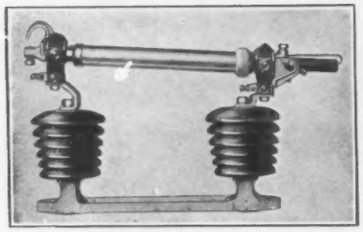

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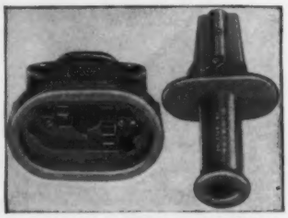

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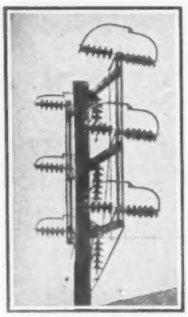

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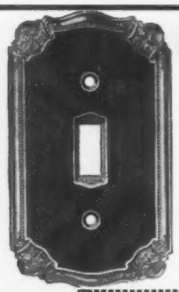

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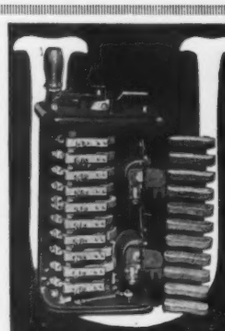

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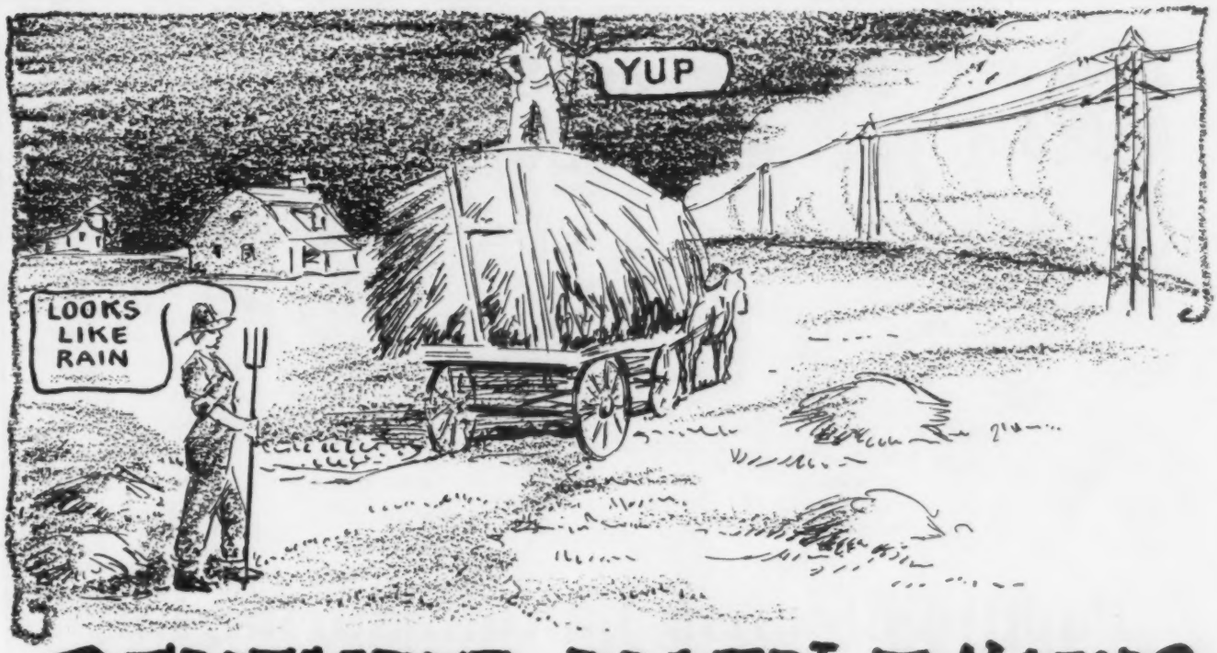

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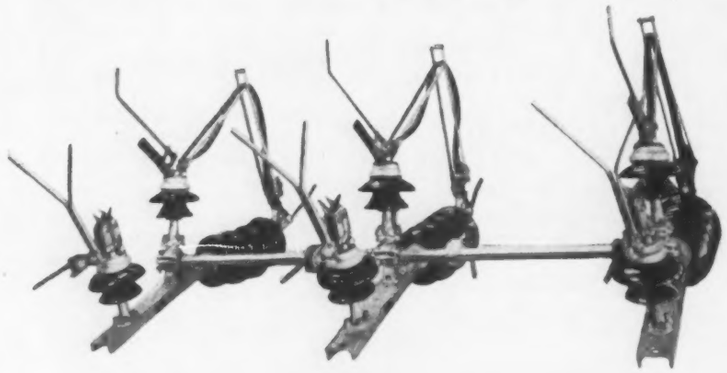

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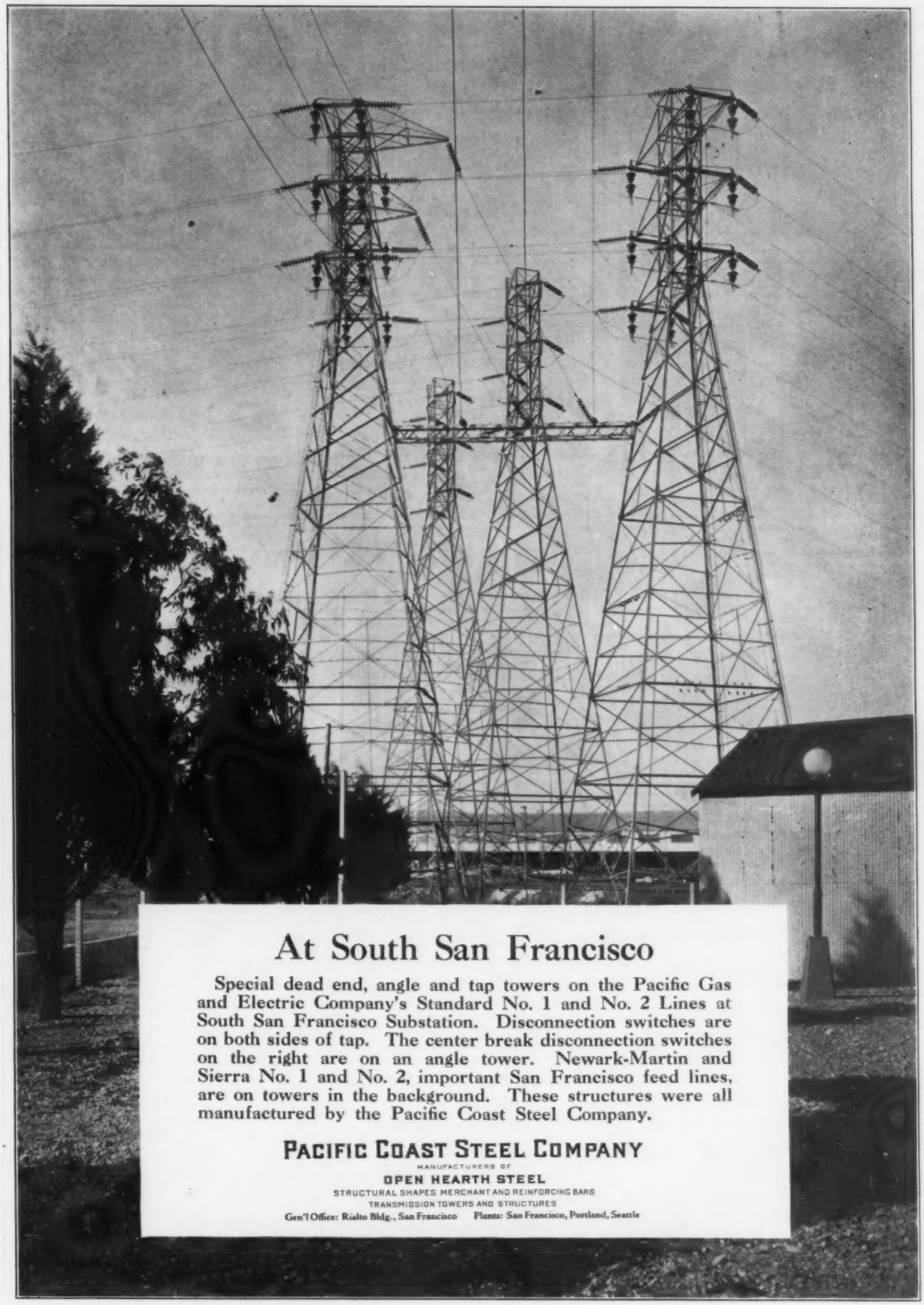

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Special dead end, angle and tap towers on the Pacific Gas and Electric Company's Standard No. 1 and No. 2 Lines at South San Francisco Substation. Disconnection switches are on both sides of tap. The center break disconnection switches on the right are on an angle tower. Newark-Martin and Sierra No. 1 and No. 2, important San Francisco feed lines, are on towers in the background. These structures were all manufactured by the Pacific Coast Steel Company.

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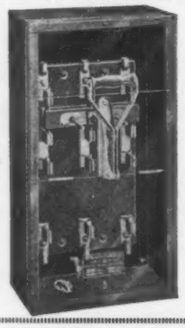

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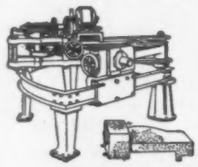

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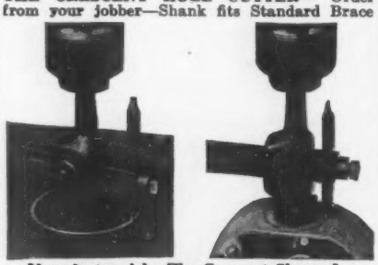

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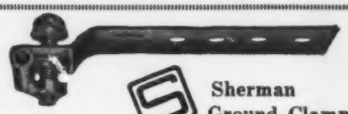

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Lindemann & Hoverson Co., A. J.
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Timken Roller Bearing Co.

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Blowers
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Trumbull Electric Mfg. Co.
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Michel & Pfeffer Iron Works

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Rockbestos Products Corp.
Standard Underground Cable Co.
Tubular Woven Fabric Co.
Westinghouse Elec. & Mfg. Co.
Youngstown Sheet & Tube Co.

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Johns-Manville Corp.

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Pacific States Electric Co.
Sangamo Electric Co.
Trumbull Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Hubbard & Co.
Matthews Corp., W. N.

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Westinghouse Elec. & Mfg. Co.

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Okonite Company, The
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Standard Underground Cable Co.
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Central Tube Co.
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Taylor Instrument Co.'s
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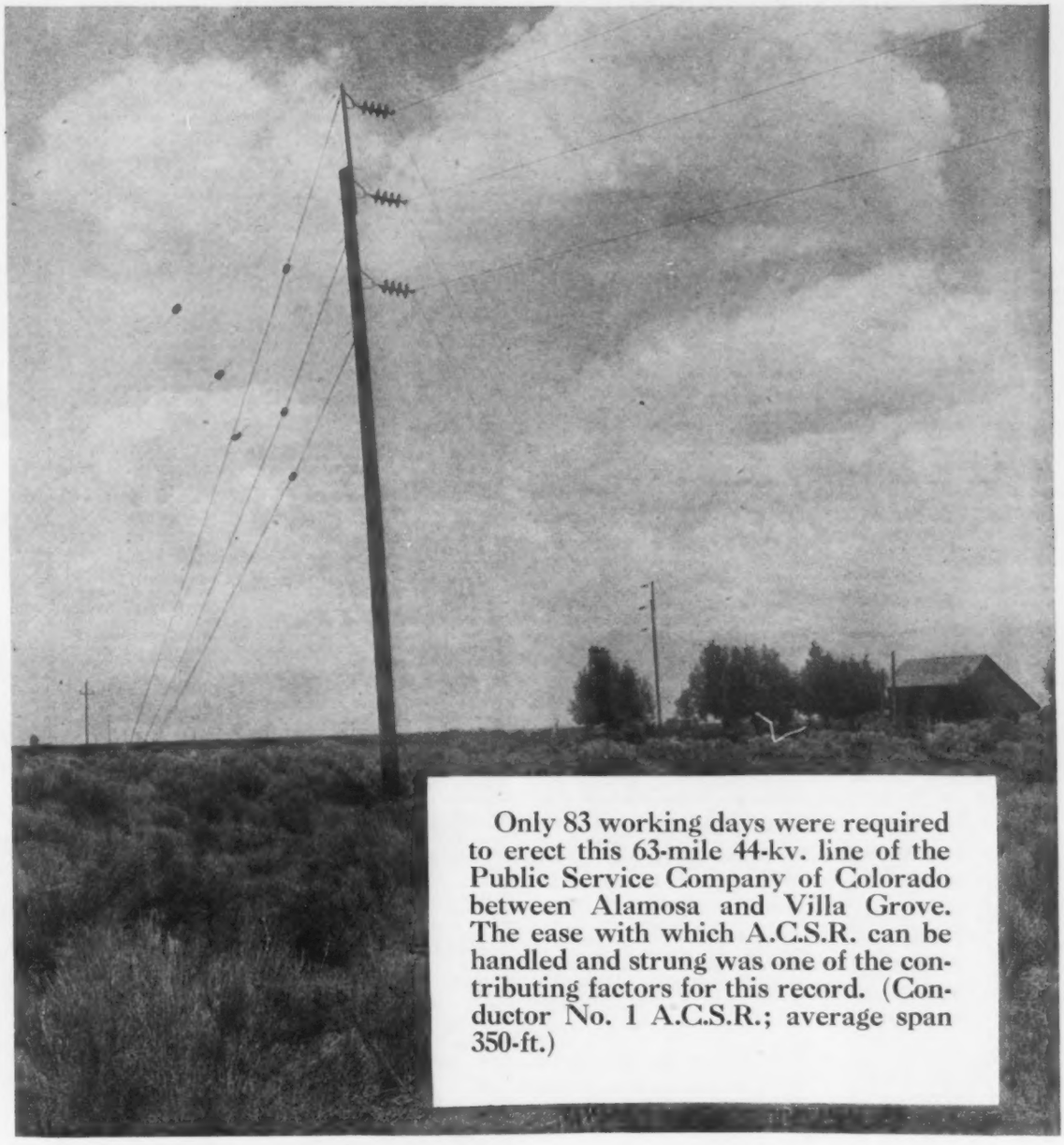

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Graybar Electric Co., Inc.
Westinghouse Elec. & Mfg. Co.
Wiegand Co., Edwin L.
Rheostats
Cutler-Hammer Mfg. Co.
General Electric Company
Graybar Electric Co., Inc.
Pacific States Electric Co.
Westinghouse Elec. & Mfg. Co.
Roofing and Siding: Asbestos
Johns-Manville Corp.
Sash: Steel Window
Michel & Pfeffer Iron Works
Separators: Oil
De Laval Separator Co., The
Sockets
Bryant Electric Co.
Hubbell, Inc., Harvey
Pacific States Electric Co.
Paulding, Inc., John I.
Soldering Equipment
Allen Co., Inc., L. B.
Graybar Electric Co., Inc.
Pacific States Electric Co.
Westinghouse Elec. & Mfg. Co.
Solenoids
Westinghouse Elec. & Mfg. Co.
Space Heaters
Cutler-Hammer Mfg. Co.
Wiegand Co., Edw. L.
Steel Buildings: Standard
Michel & Pfeffer Iron Works
Steel: Structural and Reinforcing
Pacific Coast Steel Co.
Street Lighting
General Electric Company
Graybar Electric Co., Inc.
Hubbard & Company
Pacific States Electric Co.
Westinghouse Elec. & Mfg. Co.
Switchboards
Allis-Chalmers Mfg. Co.
Automatic Switch Co.
Brown & Pengilly, Inc.
Condit Electrical Mfg. Co.
El. Power Equipment Corp.
General Electric Company
Graybar Electric Co., Inc.
Johns-Manville Corp.
Pacific States Electric Co.
Trumbull Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Switches: Automatic Time
Pacific States Electric Co.
Switches: Fuse
Kearney Corp., Jas. R.
Matthews Corp., W. N.
Pacific States Electric Co.
Switches: High Tension and Line Disconnecting
Allis-Chalmers Mfg. Co.
Condit Electrical Mfg. Co.
El. Power Equipment Corp.
General Electric Company
K-P-F Electric Co.
Kearney Corp., Jas. R.
Matthews Corp., W. N.
Pacific Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Switches: House Service
Allied Industries, Inc.
Barkelew Electric Mfg. Co., The
Bryant Electric Co.
Condit Electrical Mfg. Co.
Electrical Specialty Co., Inc.
El. Power Equipment Corp.
General Electric Company
Graybar Electric Co., Inc.
Hart & Hegeman Mfg. Co.
Hubbell, Inc., Harvey
Pacific States Electric Co.
Trumbull-Vanderpoel El. Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Switches: Motor Controlling
A. G. Mfg. Co.
Brown & Pengilly, Inc.
Colt's Patent Fire Arms Mfg. Co.
Condit Electrical Mfg. Co.
Cutler-Hammer Mfg. Co.
El. Power Equipment Corp.
General Electric Company
Graybar Electric Company, Inc.
Industrial Controller Co.
Pacific States Electric Co.
Trumbull Electric Mfg. Co.
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Union Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Tape: Friction and Rubber
Allied Industries, Inc.
Anchor Webbing Co.
General Electric Company
Graybar Electric Co., Inc.
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New England Mica Co.
New York Insulated Wire Co.
Okonite-Callender Cable Co., Inc.
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Graybar Electric Co., Inc.
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Western Electric Co., Inc.
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States Co., The
Tools: Linemen's and Construction
Amer. Pipe Bending Mach. Co.
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Klein & Sons, Mathias
Leach Company
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Towers: Transmission
Bates Expd. Steel Truss Co.
Newport News Shipbuilding & Drydock Co.
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Allied Industries, Inc.
Allis-Chalmers Mfg. Co.
Duncan Electric Mfg. Co.
General Electric Company
Graybar Elec. Co., Inc.
Pacific States Electric Co.
Packard Electric Co., The
Richards & Co., Inc., Geo.
Westinghouse Elec. & Mfg. Co.
Weston El. Instrument Corp.
Traps: Steam and Radiator
Johns-Manville Corp.
Tree-Wire
Okonite-Callender Cable Co., The
Okonite Company, The
Simplex Wire & Cable Co.
Turbines: Hydraulic
Allis-Chalmers Mfg. Co.
Leffel & Co., The James
Newport News Shipbuilding & Drydock Co.
Pelton Water Wheel Co.
Smith Co., S. Morgan
Turbines: Steam
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Welding Apparatus
General Electric Company
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Ohio Brass Company, The
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Aluminum Co. of America
Wire: Asbestos Covered
Rockbestos Products Corp.
Wire: Bare and Insulated Copper
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Roebling's Sons Co., John A.
Rome Wire Co.
Standard Underground Cable Co.
Tubular Woven Fabric Co.
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Indiana Steel & Wire Co.
Okonite-Callender Cable Co., Inc.
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Phillips Wire Co.
Rome Wire Co.
Standard Underground Cable Co.
Wire: Resistance
Driver-Harris Company
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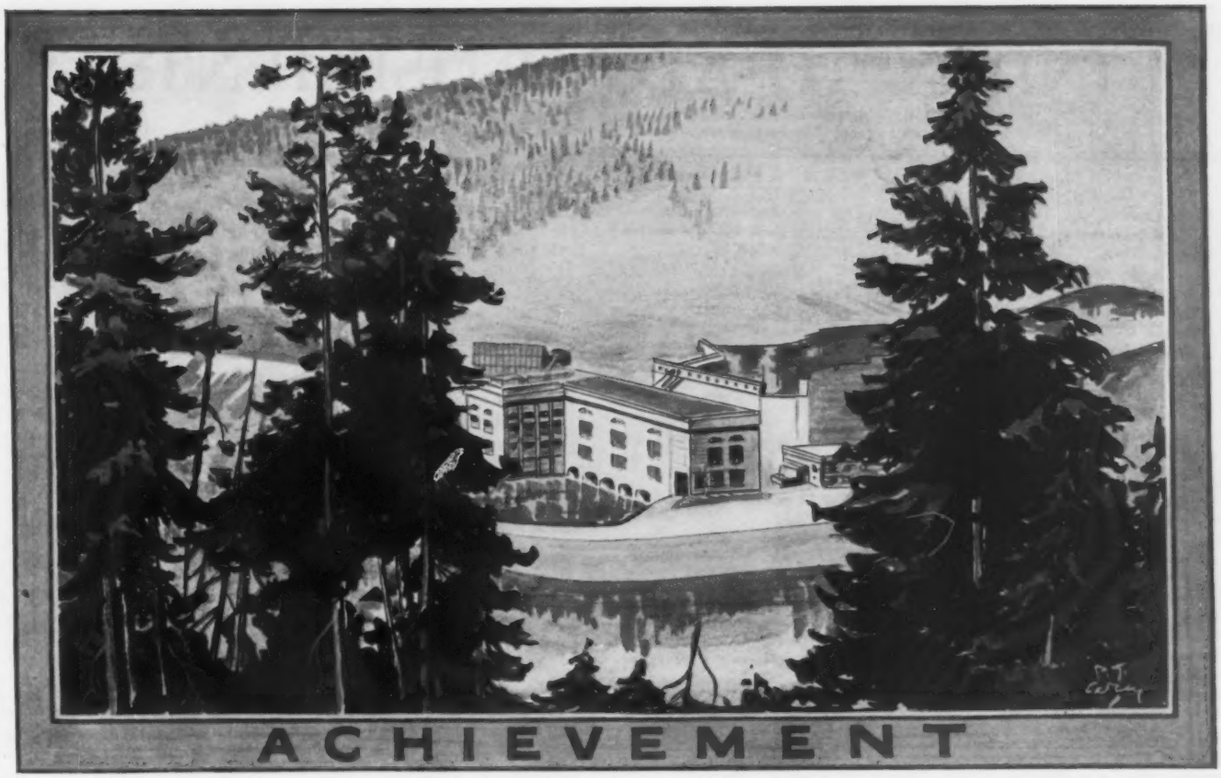

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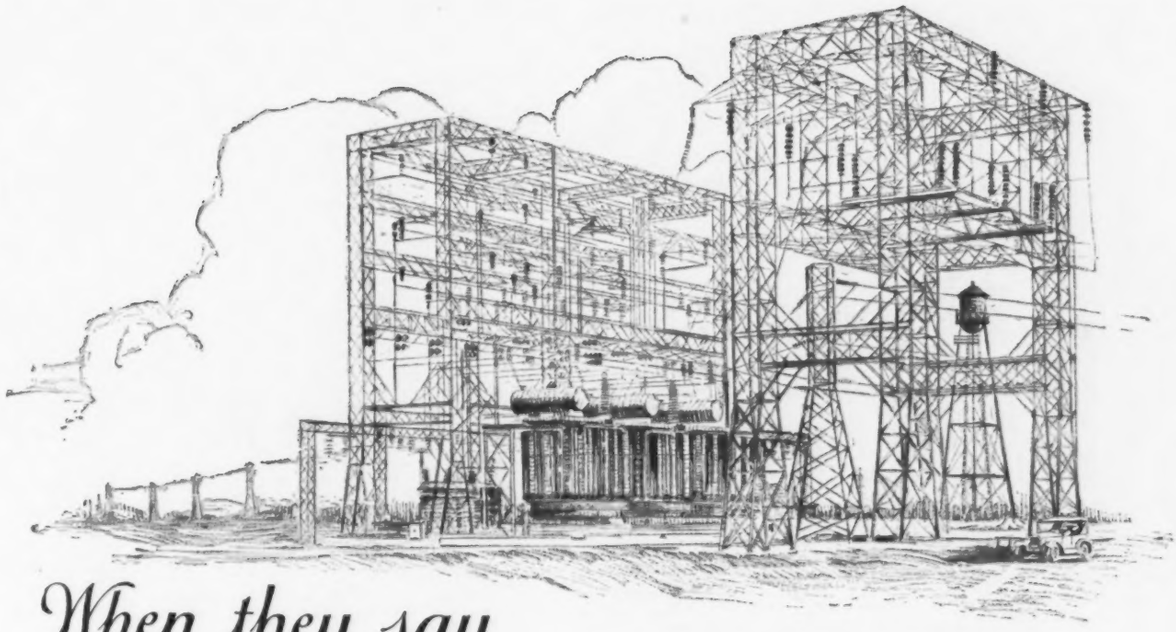

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